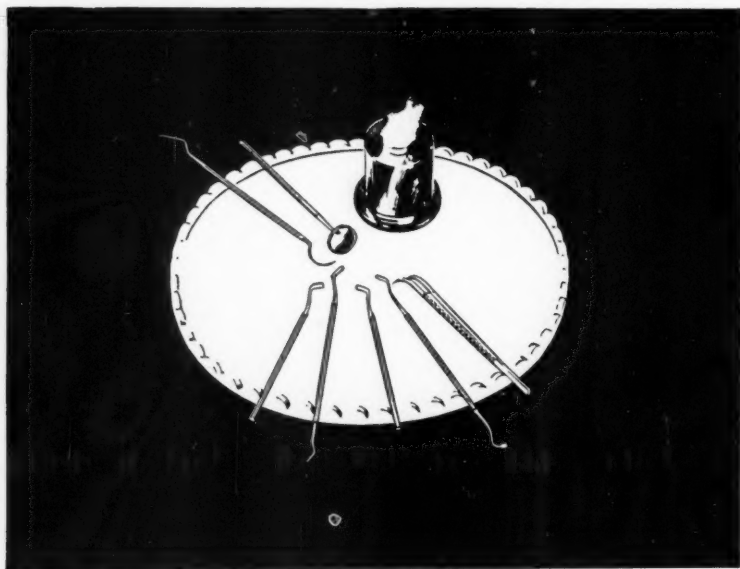


The
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CONTENTS

COMMUNICATIONS:

Page

New Guinea Walkabout	
D. A. Cameron, Barbara Sinclair and N. E. Goldsworthy	47
Some Observations on dental conditions in Papua-New Guinea, 1947, Parts I-VI.	
Barbara Sinclair, D. A. Cameron and N. E. Goldsworthy	58

EDITORIAL DEPARTMENT:

Broadening the fields of Research	94
Corrigendum	95

NEWS AND NOTES:

95

ASSOCIATION ACTIVITIES:

97

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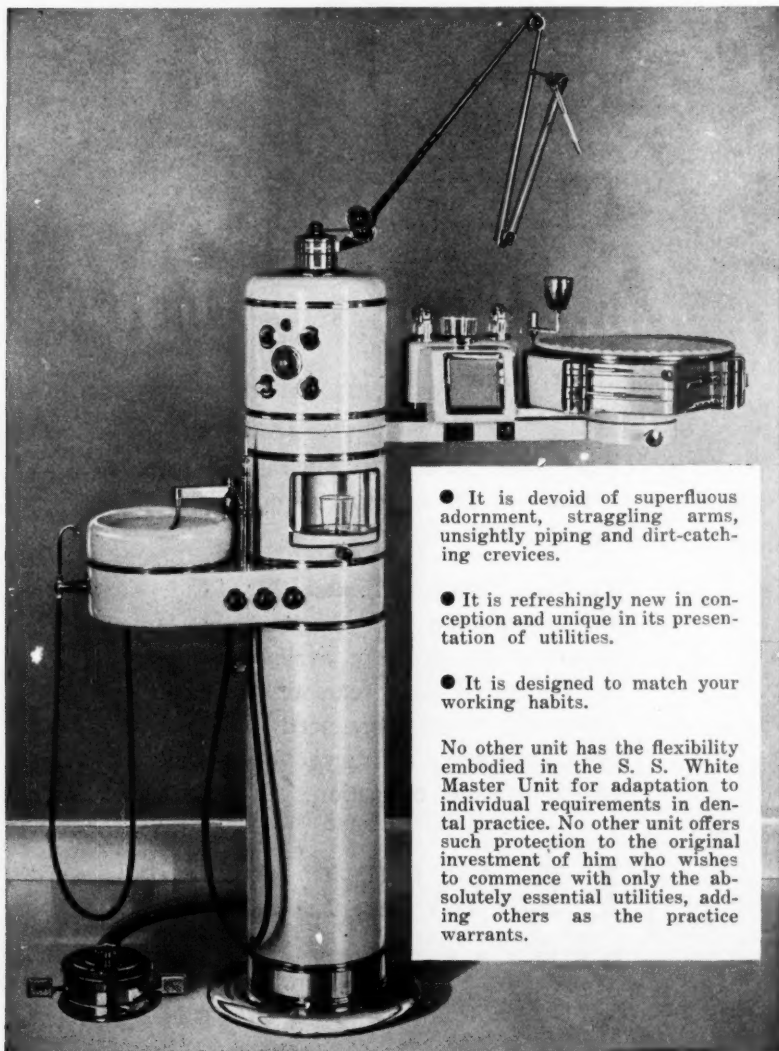
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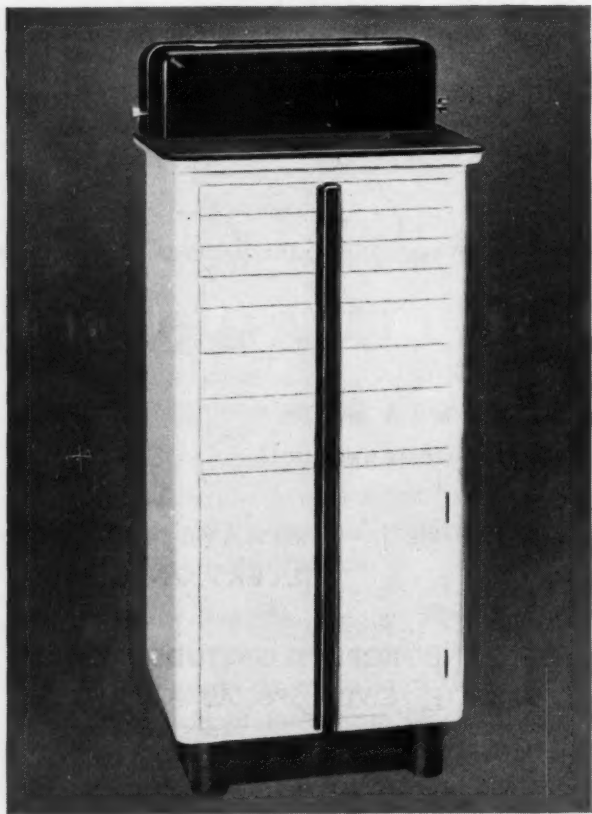
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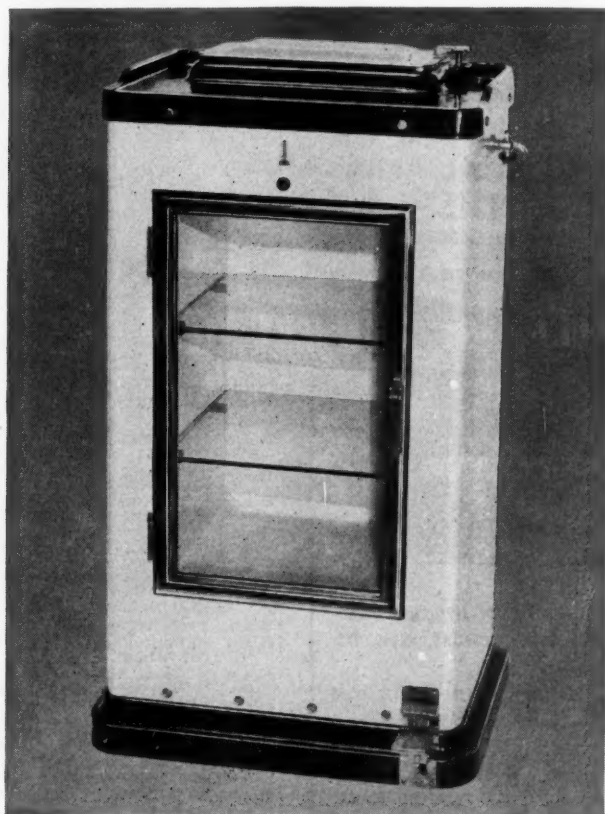
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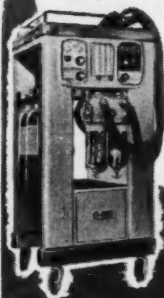
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2.05 p.m.	ENDOTRACHEAL ANAESTHESIA.
6.35 p.m.	RESPIRATORY AND CARDIAC ARREST.
6.55 p.m.	OPERATIVE SHOCK.
7.15 p.m.	HANDLING AND CARE OF THE PATIENT.
11.50 a.m., 4.55 p.m., 9.10 p.m.	ANAESTHESIA IN THE DENTAL CHAIR FOR CHILDREN.
12.10 p.m., 5.10 p.m., 9.25 p.m.	ANAESTHESIA IN THE DENTAL CHAIR FOR ADULTS.
7.45 p.m.	CLOSED CIRCUIT (CO ₂) ABSORPTION.
3.05 p.m.	PHYSIOLOGY OF ANOXIA.
4.20 p.m.	OXYGEN THERAPY IN HEART DISEASE.
11.20 a.m.	PRODUCTION AND DISTRIBUTION OF MEDICAL GASES.
6.05 p.m.	HEART AND CIRCULATION.
6.20 p.m.	MECHANISM IN BREATHING.
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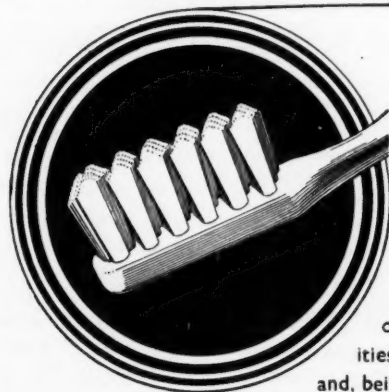
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February, 1950

No. 2

NEW GUINEA WALKABOUT.

D. A. CAMERON, BARBARA SINCLAIR and N. E. GOLDSWORTHY.

What normal child is not curious? True it is, that all too often the up-bringing, including of course the "education," to which a child is subjected, stifles for ever that divine upsurge of the intellectual faculties which are among Man's distinctive characteristics. Yet in most of us there lingers, dormant in various degrees, some of that childish urge to ask how and why, what and where, whence and whither.

The attraction, then, which the unknown has for man, might safely be regarded as a manifestation of a fundamental element in his make-up. When that unknown is dual in nature, as in the pursuit of knowledge in a primitive country (like the great island of New Guinea), only circumstances of duress would stop the ordinary mortal from yielding to that attraction. It is not a matter for surprise, then, that a suggestion (made early in 1947) that we should join the proposed New Guinea Nutrition Survey Expedition was received with more than ordinary satisfaction.

The suggestion was eventually transformed into fact and after a tantalisingly protracted period of planning, collecting equipment and persuading the appropriate Authorities of State that we were not prohibited emigrants, the miracle of modern transport was vouchsafed us: within a day the July chill of 34°S. latitude gave place to the heat of 7°S. latitude—at Lae.

This somewhat unattractive outpost of mandated-governmental officialdom had the air of artificiality and unreality which seems to envelop all "political" as distinct from economic aggregations of the human species. Add to this the general air of the decay which followed the outbreak of Peace in 1945 and the consequent departure of the Armed Services—and New Guinea begins to emerge from the mists of enchantment proverbially lent by distance. In fact for us the emergence was almost precipitate: from the dusty air-port at first-class fares in a third-class taxi over a neglected road to the hotel, where we sat—not in the shade of luxuriant vegetation in cool, comfortable arm-chairs eating luscious tropical fruits and drinking iced nectar, but—in a dirty and conventionally furnished dining-room and were served with a third-rate meal as suitable for the climate and the occasion as would be iced-water as a beverage at the south pole: hot greasy soup, hot (canned) meat and vegetables (none green) and hot apple pie! This was surpassed however by another triumph of Australian conservatism and unimaginativeness, to wit, the evening meal in the

Civil Servants' Mess, where hot plum pudding and custard brought our first day to a too, too substantial conclusion. The coup de grâce came when attempts to have a shower before bed revealed how effectively our civilisation had entrenched itself—the water supply had failed!



Figure 1. The Patrol Officer's House at Kaiapit.



Figure 2. Dinner time at Kaiapit.

At Kaiapit in the Markham Valley we joined the main party and spent our time being "run-in" to the routine of field operations and becoming acquainted with everybody's failings and personal oddities (including of course, our own!).

The skirmish at Kaiapit lasted but six days and then back to Lae to refit for the next phase—at Pātep II in the mountains. Getting things done in Lae was not a light task. The town (if such it can be called) is very scattered and our ancient battle-buggy hired "for the duration" had to be driven madly from end to end of the place, and round and about, in order to collect stores and equipment. Our own heavy apparatus (incubator and autoclave) at first could not be located, but eventually at great cost we secured the incubator. The autoclave did not come to light for many weeks and, when it did arrive, proved like the incubator to be unsatisfactory: for we quickly discovered to our dismay that the incubator was what might be described as a dual-purpose type—hot air steriliser on one side and refrigerator on the other! It was indeed fortunate that we detected this unorthodox behaviour at the beginning of our work; and after "taking thought" were able to map out a most impressive 3-dimensional "safety zone" with a (bacteriologically speaking) temperate climate.



Figure 3. The camp near Pātep II (Department of Information photograph).

The journey to Pātep II took us along the Wau-Labu road to a point near Mumeng and Zenag and with its minor excitements and mishaps filled a very enjoyable and intensely interesting nine hours. Within the almost suburban distance of 45 miles which were covered in those nine hours, we had missed the Lae-Labu vehicular ferry, wallowed in a sea of mud over a submerged steel corduroy "road," been hauled out of a bog, broken the rear axle, been forced to make dangerous detours around a bogged road-grader and an immobilised bull-dozer, been towed up steep hills because of our broken axle, seen our "tug"

shoot madly across the road into a bog when the tow-rope broke and, after all this, had arrived at our "turn-off" too late to make the ascent to the mountain-village of Pâtep II in daylight. The day ended in our going some ten miles farther along the Wau road to Zenag, where the transport company had a half-way dépôt. Here the drivers of the convoy of 3-ton trucks, in which we and our supplies travelled, gave us freely of their meagre stores and humble shelter. Anything less romantically attractive and less typically tropical can scarcely be imagined than the night spent in that galvanised iron shed set on a bare hill, shrouded in a cold mist, filled with smoke from a defective kitchen-chimney and with mosquitoes which nothing seemed to repel. Not even a lamp could be used—a high wind kept blowing it out!



Figure 4. The X-ray Apparatus in use at Patep II (Departmental of Information photograph).

Next day in pouring rain we climbed the steep and slippery mountain path to Pâtep II some 1,400 feet above the Wau road; where a site for our camp had been cleared and fenced in native fashion to exclude the local pigs. Native porters, sure-footed as mountain goats, carried up our stores and equipment (the incubator alone weighed 2 cwt. when packed) and within a couple of days we were ready to begin work. The surroundings were beautiful indeed. Periodically the mists rolled down from surrounding mountains and blanketed

our eyrie, then cleared as suddenly as they had come, revealing vista upon vista of lofty sierras half shrouded in cloud-banks of varying hues. And to the city-dweller, what peace there is among those secluded hills.

Despite several weeks of almost incessant activity (our dental team worked sixty hours or more per week) many of our party were sorry to leave the Pātep II station, with its temperate climate and superb mountain setting. True, the frequent showers kept the dust down, but several longer periods of rain made the grounds so slippery that spiked boots were necessary for safe progress.

Those of us who had not brought such footwear made perilous stages from one form of visible support to another (guy-ropes, tent poles, water-butts and our fellows), and more than one of us bit the dust (hydrated).



Figure 5. Village scene at Pātep II (Department of Information photograph).

There was time to make several trips from our hilltop: to surrounding villages, to our nearest European neighbours at Mumeng and even to Bulolo to see gold being produced by an apparently fool-proof and simple process.

Then back by the indescribable "road" to Labu, where the ferry or "barge" grounded several times in attempting to embark a heavy truck, which missed a watery grave by millimetres when the ferry, to avoid grounding again, pulled out before the operation was completed. And so to Lae and its stifling heat in preparation for the journey to the Trobriand Islands.

Not all of us, however, left for Lae by road. Reports of a high incidence of dental caries in some villages in the Buang Mountains between Pātep II and the coast made an inspection a necessity and provided a chance to 'go walk-about' for a few days to the coast and to go on by boat to Lae. Despite its nearness to Lae the route passed through several villages relatively unaffected by civilisation, where most of the inhabitants had not previously seen white women.

The scenery was similar to that near Pâtep II. The track climbed 2,000 ft. across the range before falling away to the Snake River by a series of zig-zags which provided at every turn a vista to be remembered for many years. Great kunai slopes, here and there broken by towering limestone crags and plunging waterfalls, dropped steeply to the river below. Spread out against the green of the hills our carriers in their gay laplaps added colour to the scene.

The first day was spent reaching Mapos, and we were escorted throughout the afternoon by Tol, the paramount luluai (chief) of the district, all his underlings and about 500 men and women from the surrounding hills. They met us on the bank of the Snake River, a huge deputation in honour of the white misses. It was well after dark when we reached Tol's village high up in the mountains so that it was not till the next day that we realised the beauty of its setting.

There were several "suburbs" to the village, each like a botanical garden. The houses were all swept clean and each was surrounded by a garden and even decorated with flowers. We were greeted with speeches of welcome, shown well-nigh everything, showered with gifts and generally fêted.



Figure 6. The Village of Mapos. (Department of Information photograph).

This pleasant interlude lasted only a day, and then we set off down to the river again, being well received at various villages en route.

All went well till midday when we were to pick up our next relay of carriers but too few arrived and the main party went ahead leaving two of us behind to collect the latecomers. They arrived after dark, which meant a night trip to catch up with those ahead. That part of the journey is still a nightmare. The track was rarely used and passed over a range at least 6,000 ft. up: hard enough by day but, with a hurricane lamp as the only light and relying on a police boy as guide, it was certainly no picnic. The recollection is of mud, leeches, clinging vines, ghostly phosphorescent fungi and trees that seemed

to appear from nowhere. The reunion was at 2 a.m. and the words of greeting are not for publication.

Still tired from the effort of the previous night we covered the last few miles to Busama by canoe, after wading allegedly crocodile-infested creeks. From Busama there was time for a walk to derelict Salamaua and then back to Lae by launch with the wind and sea on the stern quarter and many heads over the side.

The interval at Lae was a repetition of our previous experience there, a long session of collecting stores and weighing them for the air trip to Kiriwina. This took more time than usual, as there would be no means of replenishing stores before returning to the mainland.

There were many delays due to unfavourable weather or lack of the required transport, but towards the middle of September a two-hour flight left the mainland far behind. Kiriwina was an uninviting sight from the air and did not improve on closer acquaintance: a flat coral outcrop covered with marsh, drab-coloured jungle and low scrub relieved by fertile native gardens. In many places there were coconut plantations and the remnants of wartime installations.



Figure 7. Collecting saliva at Kavataria (Department of Information photograph).

Kavataria is on the south coast of Kiriwina, one of the twin villages near the Mission, native hospital and the A.D.O.'s office—about the most heavily populated spot on the island. There was very little resemblance to the tropical paradise we had heard of, though at night, with the scent of frangipanni heavy on the air, the place had its charm.

The camp was much less primitive than that at Pātep II. The living quarters were in a bungalow and the laboratory was a great barn of a place made of wickerwork with a thatched roof. However, from the point of view of bacteriology, the conditions were indescribably worse; the glass ware would

not remain dry, and the roof harboured all sorts of crawling things which managed to find their way into three out of every four specimens.

The natives did not understand pidgin and there was some confusion between some of the mainlanders, who came with us, and the locals; this, however, did not hold up friendly relations with the women of the village. English is taught in the schools and most of the youngsters and some of the adults could speak it well and could sing many popular songs. They provided pleasant entertainment on some nights, a group of them serenading us just for the joy of it.

Food was not a problem. There was fresh meat in the form of fowl and pig, plenty of pineapple, pawpaws, lemons, bananas and fish, fish and fish. These last came fresh from the lagoon every morning; a stick of tobacco would buy a dozen.

There was a beach for an occasional swim at the northern and more pleasant end of the island, an ideal place for relaxation. We would stay until dusk lazing in the warm water and return by the light of the moon. A tropical moon-rise defies description—a background of golden cloud and indigo sky, fringed by whispering palms.

Kiriwina was rather isolated, the local transmitter being out of order and our leaving the place was more a matter of luck than good management. The movement was done by halves as it were.

The "Mirriginni," a copra-boat of about 100 tons trading between the Trobriand Islands and the Woodlark Islands carried the advance guard. The first two days were spent loading copra, still within sight of Kiriwina. This was a tedious business as the boat was anchored half a mile out at the edge of the reef and the bags of copra came a few at a time by canoe. However, the company was pleasant enough, and on the third day we left Kiriwina behind. There was no travelling at night because of the treacherous passage, but the daytime was an enjoyable sequence of palm-topped atolls coming over the horizon, green as can be imagined, with a ring of surf and pale sand. Above the horizon ahead, gradually drawing closer, the peaks of first the D'Entrecasteaux Group and then the mainland added to the majesty of the scene.

There was another welcome at the second stopping place — Esaala on Normanby Island in the Dobu Straits where there was a high tea with the A.D.O. This "outpost" really approached the tropics of fiction, set at the foot of a great bowl of jungle-covered hills which rose a thousand feet from the palm-fringed shore.

Leaving the Straits next morning the route lay almost due south past East Cape and across Milne Bay. There was a stiff breeze from the south-east which rolled the ship considerably, and it was a relief to sleep on dry land at Samarai that night.

The rest of us "hitch-hiked" from Kiriwina to Samarai in the Roman Catholic Mission vessel, "The Morning Star," boarding her at sunset as the skipper intended to make a start before dawn the following morning.

There were only four bunks in the one cabin; so, after the three "scientists (female)" had each been allocated one, the "scientists (male)" tossed a coin for the doubtful pleasure of sleeping in the other. The losers set up their stretchers on the deck where the native members of the party and a couple of the crew "dossed down" underneath and in between them. The criss-cross

effect of arms and legs and stretchers gave one the same impression as do the works of certain schools of contemporary art.

We woke at dawn to find the ship under way and the skipper very annoyed because the alarm clock (lent him by one of us) hadn't "gone off" until an hour later than set. The sea—he told us—was calm, but his idea of "calm" proved to be very different from ours. By 7 a.m. the cabin presented a very squalid scene with the wash-basin in frequent use and a bucket on a piece of rope oscillating between two of the bunks. The fact that certain members of the party were unaffected by the *mal-de-mêr* and periodically burst in with such remarks as "It's heavenly outside" or "Won't you eat a little fried rice and plum pudding" did nothing to improve the condition of the remainder.

However, after some twelve hours, the rolling and pitching seemed to diminish, and when we managed to pull ourselves together we found the ship approaching a calm bay surrounded by high hills—after the flatness of Kiriwina they were indeed a pleasant contrast. We went ashore in the dusk and sat on the strangely heaving sand, and there (according to one informant) restored our fluid content and salt water ratio with tinned tomato soup and steaks from a fish caught by trolling and boiled in salty water. It may have been due to our biochemical readjustment or merely the calm and quietness of the evening after the restless misery of the day—but the meal, the place and the evening all seemed perfect.

A day and a half later we reached Samarai.

The "scientists (male)" and all equipment left for Port Moresby on the frigate H.M.A.S. "Shoalhaven," which happened to call in about four days later (another hitch-hiking job) but the customs of the Navy were kept inviolate and the three "scientists (female)" became "the girls they left behind," for whom there followed—through the kindness and hospitality of the residents of Samarai—a week of what, compared to our Spartan existence in the field, was definitely the social flutter of the New Guinea adventures.

Then one morning we females went by launch to Milne Bay—a great empty stretch of water surrounded by hills, where a handful of men were battling against the jungle and rust to gather what was useful of the surplus war-time stores and debris. From there we flew to Port Moresby, by favour of the Vacuum Oil Company, which was at that time salvaging 44-gallon drums in the Milne Bay area and had an Anson (locally known as the Gamadodo Air Lines Incorporated) flying to and from Port Moresby once or twice a week. When we first reached it early in November Port Moresby was dry and dusty and, except for its beautiful bay and native inhabitants, very similar to many towns in western New South Wales.

The red letter day for our reunited party came when we paid a formal call upon the Administrator—an occasion which caused an intensive overhaul and ironing of faded cotton frocks and much searching after long forgotten neckties. Late in the afternoon we watched a march past of some of the Royal Papuan Constabulary and the ceremony of Retreat: an impressive sight, with coconut palms and pink frangipanni in the foreground and the sun setting behind the hills on the other side of the bay.

We left for our next station on the "Leander", and veering north-west kept within the coastal reef, so that the journey was calm, calm enough indeed even for *our* fastidious stomachs!

Morning found us within sight of the delta of the Kikori River, a low flat land mass showing dull green on the horizon. On entering the channel the different types of trees became more clearly visible. Huge, curious palms, at first reminiscent of geological ages long past, proved to be merely the common Nipa palms. We passed the new village of Korovagi, consisting of as yet the mere skeletons of new houses in European style and laid out in straight streets, and the miserable hovels clustered along the muddy banks where in the meantime, despite overcrowding, everyone lived on good terms with his neighbours.



Figure 8. Purari River at Korovagi.

Round the next bend we sighted a clearing and some new buildings—this was to be our home and workplace for the next month. Roughly made step ladders led up to each of the buildings, a mode of entry which for the first week caused much stiffness and even more complaining. Indeed before getting up one would lie awake in the morning organising the day so as to eliminate as many trips up and down stairs as possible.

In many ways the Korovagis were very different folk from the Kiriwinans: much darker in colour and, except for a few adolescents, all very thin. Many were wearing dirty European clothes. Most of them took fright straight after their tuberculin injections and went bush (as we were told) to "make sago", and it was only after a couple of weeks of careful persuasion that they came back to the village and camp to submit to further examination; later, however, they became more friendly, and once even invited us to watch one of their most popular pastimes—football.

On the whole the time passed quickly and uneventfully in the routine of work, and December 6th saw us loading our luggage and gear onto the "Doma,"

the biggest vessel on which we had yet travelled. She had to anchor a mile down the stream and our loading had to be done by means of a tender—two native canoes tied together.

The "shortest way home was the longest way round" as we travelled to Port Moresby via Kikori, Daru and Yule Island. The highlight of the journey was at Kikori where we took on board about fifty indentured labourers leaving home for a year "to see the world" by working in various parts of the Territory and our departure at dawn was accompanied by an unforgettable scene of grief—the "Doma" was surrounded by canoes filled with mothers and fathers, wives and children all wailing and many beating their breasts; and many more lined the river bank. Thus we slowly moved off, canoes drifting farther behind us, and their occupants waving mournfully until they were out of sight round a bend in the river.

Arriving back at Moresby some five days later we found the Poincianas in flower and the hills fresh and green, as the "wet" had just begun.

The three "scientists (female)" were the first to leave for home, a gesture on the part of the male members which was greatly appreciated.

SOME OBSERVATIONS ON DENTAL CONDITIONS IN PAPUA— NEW GUINEA, 1947, WITH SPECIAL REFERENCE TO DENTAL CARIES

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with appendices by

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PART I.

GENERAL INTRODUCTION.

In the study of Preventive Dentistry, field investigations are an essential complement to studies in the laboratory and in the final analysis the population of a district or country is the best or only testing-ground for any hypothesis relating to the establishment and maintenance of health (as distinct from the restoration of health to the diseased and injured in therapeutic centres).

In the latter half of 1947 the Institute of Dental Research participated in the Nutrition Survey in the Territories of Papua-New Guinea, where the survey unit was operating with the object of studying the health, nutrition, diet, agriculture and general socio-economic status of the natives in several widely separated districts. The participation of the Institute in this Survey was in effect an expression of our belief that nutrition, diet, agriculture and general physical condition, including (and especially) dental condition, are inextricably bound up with one another.

Particular aims of the dental survey. It is well known that the majority of civilised populations suffer very extensively from dental caries and that the disease in such populations is the subject of intensive study. Also it is generally accepted that most native peoples of so-called uncivilised countries, so long as they follow their own traditional ways of life, suffer by comparison relatively little from caries.

The original intention was to make clinical and bacteriological studies of the mouths of selected groups to determine the incidence of dental caries and of the *Lactobacillus acidophilus* and, where possible, to include subsidiary observations, as for example on periodontal and anatomical conditions: in general this plan was followed.

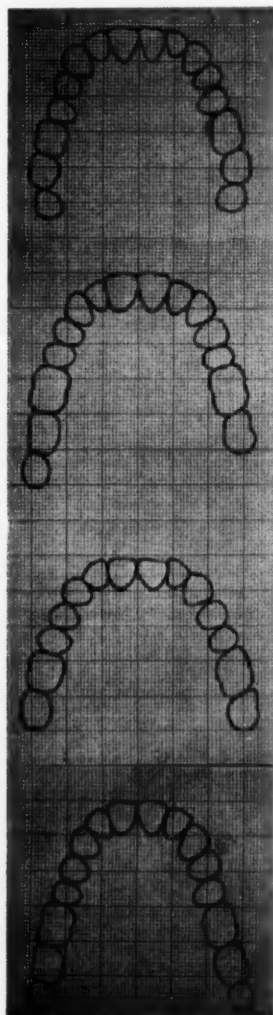
Locations. The Nutrition Survey party visited five different villages but we were represented at only three.

Patep II is on the hills immediately beside the Wampit River and about 45 miles from Labu on the southern side of the Markham River near Lae. The village is 3,000-4,000 feet above sea-level and the climate more temperate than tropical. About 150 villagers, almost the total population, were available for examination. Their contact with white people and Western Civilisation was very limited by reason of the situation of the village, although many of

*Members of the New Guinea Nutrition Survey Expedition, 1947.

†Working with the aid of a grant from the National Health & Medical Research Council of Australia.

the men had worked as labourers elsewhere during the War. *Kavataria* is on Kiriwina, one of the Trobriand Islands. Out of the total population of about 300 approximately 100 villagers of all ages were examined. They had had more contact with white people than had the inhabitants of either Pātep II or Korovagi; a mission station, a sub-district office and a trade store were all situated within about two miles of the village and the U.S. Armed Forces and R.A.A.F. used stations on the island during the War. However, in spite of this, the desire of the natives to retain their old ways of life was very strong; they were comparatively reluctant to work for or imitate the white man and

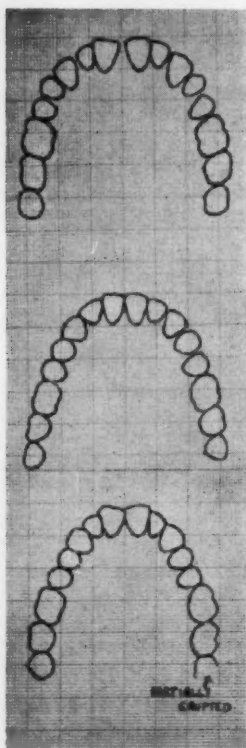


SOME OF THE ARCH-FORMS OBSERVED IN
PĀTEP II.

- | | <i>Anterior Segment.</i> | <i>Posterior Segment.</i> |
|------|--------------------------|-------------------------------------|
| I. | Straight. | Rounded. |
| II. | Straight. | Straight. |
| III. | Straight. | Straight
(and widely diverging). |
| IV. | Tapering. | Straight. |

Fig. 1.

SOME OF THE ARCH-FORMS OBSERVED IN KAVATARIA.



V. Anterior Segment.
Rounded.

Posterior Segment.
Rounded.

VI. Anterior Segment.
Rounded.

Posterior Segment.
Straight.

VII. Anterior Segment.
Tapering.

Posterior Segment.
Rounded.

Fig. 2.

had resumed their traditional yam culture and fishing activities after the end of the War. Korovagi is on the Purari Delta and about 200 miles west of Port Moresby. Kikori, the headquarters of the Delta Division of Papua, is some 60 miles to the west of Korovagi. Out of the total population of 421 (84 of whom were absent from the village) 100 were examined. The Korovagi people have had little contact with Europeans in their home territory but the village has nevertheless supplied a good deal of labour to other areas, as is shown by the fact that at the end of 1947 there were 36 adult male labourers absent from the village-area.

The data will be presented under a series of headings covering anatomy, occlusion, developmental aberrations, attrition, periodontal diseases and dental caries. The data for Parts covering Anatomy, Attrition and Occlusion have in the main been derived from plaster study-models and due to lack of time in Kavataria and Korovagi only a very small number of subjects was studied. Hence these observations can hardly be regarded as more than pointers for subsequent researches.

The number of subjects for whom satisfactory data were obtained is not necessarily the same for any two conditions studied; hence the apparent

discrepancies in numbers when textual or tabular matter in one section of this paper is compared with the content of another section.

Likewise, minor differences in results and conclusions published in preliminary accounts of this work are due to the incompleteness of the data available at the time of preparation of such preliminary accounts.

PART II.

ANATOMY.

INTRODUCTION.

The material available for study has imposed strict limitations upon the information which could be assembled. Three sets of features have been studied on subjects with normal or nearly normal occlusion, namely:—

- | | | |
|-----|---|---|
| A = | { | (i) size of maxillary arches, |
| | | (ii) proportion between size of the maxillary incisors and the width of the maxillary arches, |
| B = | | (iii) shape of the maxillary arches. |

The first two are conveniently grouped under heading "A", the other under "B".

The data discussed in this section of the paper represent the results of a study of the plaster casts of the maxillary dental arches of people in the three villages visited. Casts were made of nearly all the adult population in Pâtep II,



Fig. 3.

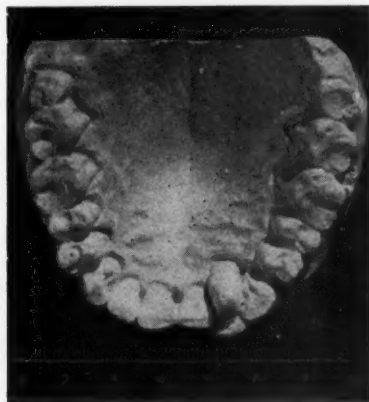


Fig. 4.

but in Kavataria and Korovagi lack of time prevented us from making them for more than about twenty subjects in each village. Unfortunately we were unable to obtain skulls on which to study the anatomy of the face and cranium and measurements were not made in the field.

A. Size of the Maxillary Arches and Proportion between Size of Maxillary incisors and the Width of the Maxillary Arches.

METHODS.

In determining the size of the arch only those models (of adults) were studied which showed no evidence of distortion or of gross malocclusion or of malposition of the teeth due to loss of adjacent or opposing teeth. Three systems of measurement were employed—Flower's, Wilder's and Pont's.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Flower's method¹ was used to measure the external width of the maxillary arch: with internally curved calipers the measurement was taken between the outer borders of the alveolar arch immediately above the second molar teeth. Wilder's² method was used to measure the palatal width, that is the distance between two points on the surface of the gingivae a millimetre above the gingival margin where it is in apposition with the lingual surface of the maxillary second molar: this distance was measured with the aid of straight dividers. The palato-maxillary length could not be measured because it was impossible to be certain of the position of the landmark forming the posterior end of this line (that is, the posterior border of the horizontal plate of the palatine bones).

Pont³ computed an index for Caucasian races which, in subjects with normal occlusion and ideal arches, relates the sum of the widths of the upper

¹Flower, W. H.—On the cranial characters of the natives of the Fiji Islands. *J. Anthropol. Inst.*, 10:153 (161), 1881.

²Wilder, H. H.—A laboratory manual of anthropometry, Philadelphia, p. 51, 1920.

³Pont, A.—Der Zahnindex in der Orthodontie, *Z. Zahnärztl. Orthop.*, 3:306, 1909. (Cited by Salzman, J.A.—Principles of Orthodontics, Philadelphia, p.471, 1943.)

four incisor teeth to the distance between distal ends of the occlusal fossae of the two maxillary first premolars, and also to that between the mesio-occlusal pits of the two maxillary first molars. Thus, if a particular individual has wide incisors, he should ideally have a wide span across the palate between the two upper first premolars.

For each individual are recorded in millimetres (a) the sum of the greatest width of each of the upper four incisors (measured with orthodontic calipers); (b) the distance between the posterior termination of the occlusal fossae of the maxillary first premolars; (c) the distance between the mesio-occlusal fossae of the maxillary first molars.



Fig. 9.



Fig. 10.



Fig. 11.

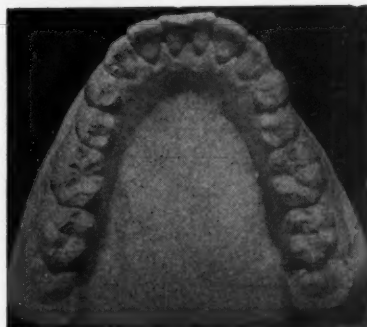


Fig. 12.

The table given by Pont shows the ideal magnitudes of (b) and (c) for the various incisor-widths. For each of our subjects the difference between the ideal given in Pont's table and the observed measurement was calculated.

RESULTS AND DISCUSSION.

When the material to be studied consists of plaster models, any measurements other than those between points on the teeth themselves lose accuracy because of the thickness of the mucosa and the variable amount of compression of the soft tissues during the taking of the composition-impression. Thus Pont's system of measurements is more suitable for specimens of the type available to us than is Wilder's or Flower's. However, as far as we know, no other anthropometric data have been recorded on the basis of Pont's refer-

ence points: these are ainly employed by orthodontists, who use them as a guide when correcting the occlusion and arch-forms of their patients. On the other hand, Wilder's and Flower's measurements are widely used and quoted. We have therefore subjected our data to analysis by all three methods.

Table 1 shows the mean and the standard deviation of the measurements of the maxillary arch-width (Flower) and of palatal width (Wilder). For comparison the table includes some results given by Campbell⁴ (*loc. cit.* p. 36-39) for Australian aborigines. It is apparent that the maxillary arches examined by us were large. This particularly appears to be so in relation to the palatal widths of the people in Korovagi, among whom, allowing for the thickness of the musoca, the *mean* palatal width (40 mm. and thickness of mucosa, probably about 1 mm each side) would be nearly as great as the largest measurement (44.5 mm) obtained on the Australian aborigines.

TABLE 1
Size of the Maxillary Arches.

Population	Arch-width (Flower ¹)			Palatal width (Wilder ²)		
	No. measurements	mean (mm)	σ	No. measurements	mean (mm)	σ
Pātep II	38	66.5	± 2.3	45	36.5	± 2.75
Kavataria	10	67.0	± 4.2	10	36.0	± 2.8
Korovagi	15	68.5	± 3.5	15	40.0	± 3.5
Australian Aborigines' Skulls (Campbell ⁴)	106	62.1	Range 56-75.5	106	39	Range 32-44.5

σ = standard deviation.

TABLE 2
The Difference between Pont's Ideal and the Observed Distance.

Difference (mm) between ideal and observed distance	Distance between upper first premolars : P_1			Distance between upper first molars : M_1		
	No. subjects at			No. subjects at		
	Pātep II	Kavataria	Korovagi	Pātep II	Kavataria	Korovagi
-8 to -6	2	2	0	0	1	1
-5 to -3	17	3	1	13	0	0
-2 to 0	15	2	2	11	2	2
0	2	1	3	3	0	0
0 to +2	7	2	1	8	4	1
+3 to +5	1	0	0	3	1	3
+6 to +8	0	1	0	1	0	1
+9 to +11	0	0	0	0	1	0

⁴Campbell, T. D.—Dentition and palate of the Australian Aboriginal, Adelaide, 1925.

Table 2 shows the frequency distribution of the differences between the calculated ideal and the observed measurement of Pont's P_1 and M_1 distances. It will be noted that in Pâtep II the general tendency was for the measured P_1 and M_1 distance to be slightly lower than the calculated ideal for any particular individual. In Kavataria also, the P_1 distance tended to be slightly lower than the ideal; of the M_1 distances more fell just above the ideal, though the scatter was wide. Somewhat similar conditions existed in Korovagi.



Fig. 13.

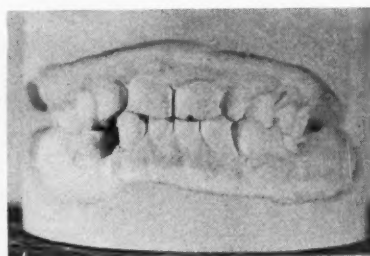


Fig. 14.

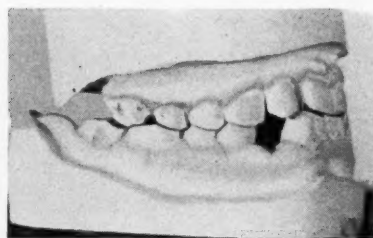


Fig. 15.

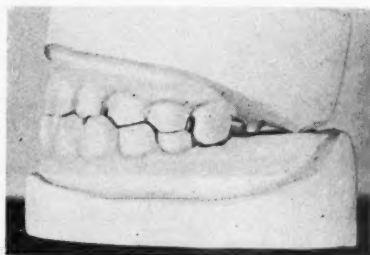


Fig. 16.

CONCLUSIONS.

Because the number of observations is small and the measurements were made on plaster-models instead of skulls, it is difficult to draw any justifiable conclusions from the data obtained by the methods of Flower and Wilder. On the other hand measurements according to Pont's system indicate that the proportion between the size of the anterior teeth and the width of the arch of these native Papuans and Melanesians approximated fairly closely the ideal proportions, which were originally postulated for Caucasian races.

B. The Shape of the Arches.

Various systems for describing and classifying the shape of the dental arch have been devised. Some observers discuss the arch or palate as a whole when describing its shape, others confine themselves to a description of the arrangement of the upper six anterior teeth.

Topinard⁵ describes four types of arch:

- (a) hyperbolic, when the arms of the arch are widely divergent posteriorly;
- (b) parabolic, when they diverge somewhat less widely;
- (c) hypsiloid or U-shaped, when they are exactly parallel;
- (d) elliptical, when they converge posteriorly, whatever the degree of such convergence may be.

On the other hand, Swenson⁶ describes the line of only the six anterior teeth and considers that there are three types of arrangement—square, ovoid

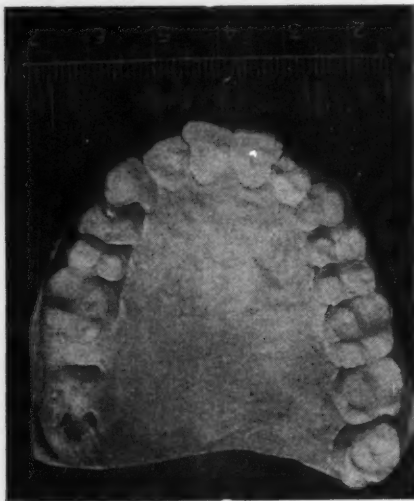


Fig. 17.

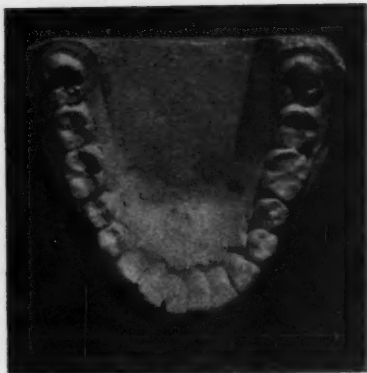


Fig. 19.



Fig. 18.

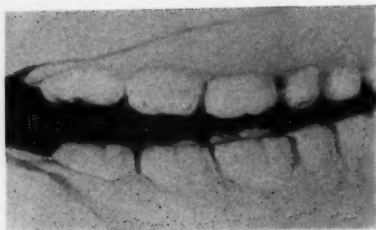


Fig. 20.



Fig. 21.

⁵Topinard, P.—*Anthropology*, London, p.260, 1894.

⁶Swenson, M. G.—*Complete dentures*, St. Louis, p.382, 1940.

and tapering. Other observers believe that this nomenclature can be applied to the upper arch as a whole and also to the outline of the face and of the upper central incisors; that is to say, in any one individual, if the upper arch is ovoid, then ideally the face and upper central incisors are also ovoid.

METHODS.

As in Subsection A plaster casts provided the data. After an examination of these models (only those with *normal occlusion* were studied in this connection) it became apparent that, whichever classification was employed, only a limited number of models fell easily into one or other group. In some cases the direction and shape of the posterior arms of the arch were independent of the shape assumed by the line of the six anterior teeth. For example, some were seen which presented a rounded arrangement of the anterior six teeth and two straight diverging lines of bicuspids and molars. The following basis of classification was therefore devised for the New Guinea populations.

The arrangement of the anterior six teeth was described as by Swenson. This usually resolved itself into a consideration of the position of the cuspids

TABLE 3
Number of Persons with the Different Forms of the Maxillary Dental Arch.

Population	Anterior Segment		Posterior Segment	
	Form	No. of subjects	Form	No. of subjects
Pātep II	straight	5	straight slightly rounded rounded	2 1 2
	rounded	27	straight slightly rounded rounded	8 8 11
	tapering	3	straight slightly rounded rounded	2 1 0
Kavataria	straight	0	straight slightly rounded rounded	0 0 0
	rounded	4	straight slightly rounded rounded	2 0 2
	tapering	3	straight slightly rounded rounded	1 1 1
Korovagi	straight	1	straight slightly rounded rounded	0 0 1
	rounded	3	straight slightly rounded rounded	0 1 2
	tapering	0	straight slightly rounded rounded	0 0 0

as related to that of the central incisors. When the cuspids were nearly as far forward as the centrals the arrangement was described as straight; and when they were well behind the centrals it was considered to be tapering. However, because there were forms intermediate between the straight, ovoid and tapering, in many cases the classification was of necessity somewhat arbitrary.

The posterior arch-form was assessed on the line of the occlusal fossae of the teeth posterior to the canines. Three forms have been described—straight, slightly rounded and distinctly rounded. The line of the posterior teeth could be rounded in several ways: the most frequent was where the first and second premolars and first molar were in a straight line, and the second and third molars were placed slightly towards the midline in the sagittal plane. Sometimes it was only the third molar which was so placed and gave the line its rounded appearance. However, there were some subjects who had a truly rounded posterior segment in which all the teeth were on a curve.

RESULTS.

The results are set out in Table 3. The most frequently seen type of arch was that in which both the anterior and the posterior segments are rounded. Straight and tapering forms of the anterior arch occurred but rarely. When seen they were associated with either straight or rounded posterior segments. In any one village there were among people with normal functional occlusion arch-forms which are entirely different. For examples from Pâtep II see fig. 1, and from Kavataria see fig. 2.

DISCUSSION.

In view of the fact that these subjects are from comparatively isolated communities, such variation in the shape of the maxillary arches as was observed between individuals is somewhat unexpected. Furthermore, to describe adequately the arch-forms seen it was found necessary to consider the anterior and posterior segments of the arch separately (because in many cases their combined arrangement did not conform to any of the generally accepted arch-forms). Such considerations may raise the question of whether there has been more racial admixture among the New Guinea natives than is sometimes supposed.

It is usually considered that in white races the tapering form is the most frequently seen. Price⁷ has described the perfectly rounded arches of the Peruvians and Campbell⁸ (*loc. cit.*, p. 38) considers that the shape of the palate in Australian Aborigines is usually hypsiloid (U-shaped). Thus it would appear that these New Guinea natives with their preponderance of rounded arches resemble the Peruvians more than they do the Caucasians or the Australian Aborigines. However, it is difficult to compare different observers' descriptions of the *shape* of any given feature.

The arch-form in any single individual may not be static throughout life, but rather subject to gradual change; hence data collected from a group of people, of which each individual was studied over a number of years, might be a more valuable contribution to our knowledge of arch-forms.

⁷Price, W. A.—Light from primitive races on the relation of nutrition to individual and national development, J.Amer.Dent.Ass., 26:938, 1939.

PART III.

DEVELOPMENTAL ABERRATIONS.

INTRODUCTION.

The term "developmental aberration" includes for the purposes of this report supernumerary teeth, odontomes, diminutive or otherwise unusual crowns and congenital absence of teeth; for convenience certain pathological states, such as impaction, will also be discussed here.

MATERIALS AND METHODS.

The data were collected by making clinical and radiographical examinations. Before regarding the absence of a tooth as a congenital defect, account was taken of the possibility or likelihood that its absence was the result of caries or periodontal disease, and congenital absence was not accepted as established unless the following requirements were met:—

- (i) failure to obtain a history of the presence at any time of a tooth at the site concerned;
- (ii) very slight or no bone-loss around the remaining teeth (radiographical evidence);
- (iii) absence of caries from the remaining teeth;
- (iv) absence of radiographical evidence of an unerupted tooth at the site concerned.

RESULTS AND DISCUSSION.

The results are set out in Table 4, which includes also figures for a group of 163 white students (Lilienthal⁸). In Table 5 Australian Aborigines (Campbell⁴ *loc. cit.*, p. 21-27; 60) are compared with New Guinea natives.

ODONTOMATA.

The three instances observed occurred in the upper anterior region and in each case consisted of a single mass of calcified tissue, in size not exceeding 10mm x. 5mm (fig. 3).

SUPERNUMERARY TEETH.

Supernumerary teeth have been reported in many different races geographically and chronologically widely separated, for example in the skulls of Australian Aborigines (Campbell⁴ *loc. cit.*, p. 25) and of American Indians (Webb⁹). Details of these irregularities, as observed in New Guinea natives, are shown in Table 4 (figs. 4, 5, 6).

There are occasional reports in the literature of fourth molars having been observed; for instance, one in a woman of German descent (Gabriel¹⁰) and in the skull of an Australian Aborigine and of a New Caledonian (Wilson¹¹). However, no fourth molars were observed in the New Guinea Groups.

⁸Lilienthal, B.—Some abnormal oral conditions present in young adults, *Dent.J. Aust.* 19:78, 1947.

⁹Webb, C. H.—Dental abnormalities as found in the American Indian, *Amer.J. Orthod.Oral Surg.*, 30:474, 1944.

¹⁰Gabriel, A. C.—Case of a well-formed lower fourth molar in Man, *Dent.J.Aust.*, 19:138, 1947.

¹¹Wilson, J. T.—Two cases of fourth molar teeth in the skulls of an Australian Aboriginal and a New Caledonian, *J.Anat.Physiol.*, 39:119, 1905

CONGENITAL ABSENCE OR DIMINUTIVE FORMS OF TEETH.

Altogether 21 people exhibited the congenital absence or diminutive form of one or more teeth. Third molars and maxillary lateral incisors were most frequently affected, but in some instances bicuspid and second molars also were congenitally absent (figs. 7-11). One person showed an absence (judged to be congenital) of 7 teeth.

A difference between white subjects and New Guinea natives was noted in relation to the third molars; in the white subjects they were generally all present or all absent, whereas in the natives generally only one or two were absent.

IMPACTION AND MALALIGNMENT.

Impaction of canines and third molars was more than ten times as frequent in white students as in New Guinea adults (33% of 163 and 3% of 209 respectively). Figure 12 shows the type of impaction of lower third molars which was observed in New Guinea. An impacted canine is shown in fig. 13.

Malalignment caused by loss of adjacent or opposing teeth was observed but not recorded in detail.

TABLE 4
Developmental Aberrations observed in New Guinea Natives.

Abnormality	Village of Pătep II		Village of Kavataria		Village of Korovagi		Group of 163 white medical & dental students examined by Lilienthal ^a	
	No. examined in village 136 (adults 87)		No. examined in village 94 (adults 60)		No. examined in village 101 (adults 63)		No. people with abnormality	No. occurrences abnormality
	No. people with abnormality	No. occurrences abnormality	No. people with abnormality	No. occurrences abnormality	No. people with abnormality	No. occurrences abnormality		
Odontomes ...	2	2	0	0	1	1	0	0
Supernumery upper incisors ...	2	2	4	1	1	1	0	0
Supernumery bicuspid (un-erupted) ...	0	0	1	(mandibular: 2 on each side)	0	0	1	3 on each side; (2 maxillary 1 mandibular)
Congenitally absent maxillary lateral incisors ...	1	1	3	4	1	2	1	2
Congenitally absent bicuspid ...	1	2	1	1	0	0	0	0
Congenitally absent second molars	2	2	0	0	0	0	0	0
Congenitally absent third molars ...	7	12	0	0	0	0	8	28
Small or peg-shaped upper lateral incisors ...	2	3	0	0	2	2	—	—
Small or peg-shaped third molars ...	1	2	2	2	1	1	—	—
Impacted or mal-aligned third molars ...	2	4	3	3	1	1	50	86
Impacted maxillary canines ...	1	2	0	0	0	0	5	5
Impacted maxillary bicuspid ...	0	0	1	1	0	0	—	—

APICAL RAREFACTION.

Apical rarefaction of the bone was seen in three subjects in relation to teeth with clinically normal crowns. This was probably due to trauma: a suggestion borne out by the history of one of the subjects.

IRREGULARITY OF ROOTS.

Irregularity in the roots of the upper lateral incisors was observed several times in the radiograms from Pâtep II, sometimes bilaterally, sometimes unilaterally.

TABLE 5
Developmental Aberrations in Australian Aborigines and New Guinea Natives.

Race	No. subjects observed	Odontomes		Supernumerary teeth		Congenitally absent teeth		Diminutive forms of crowns	
		No. subjects	No. observed	No. subjects	No. observed	No. subjects	No. observed	No. subjects	No. observed
Australian Aborigines (Campbell) ⁴	600 (skulls)	1	1	9	9	9	15	—	—
New Guinea Natives	331 (living; all ages)	3	3	5	8	10	24	8	10

SUMMARY.

Developmental aberrations in native races are by no means rare. However, some abnormalities, such as impaction, were much commoner in white Australian students than in New Guinea natives.

PART IV.

ATTRITION.

INTRODUCTION.

Attrition may be defined as the wearing away of tooth substance by the rubbing of one tooth-surface against another or by the action of any abrasive material which may be part of or incorporated in the food. Attrition may also be brought about by habits other than mastication of food, e.g., the chewing of skins and vegetable fibres in certain crafts, or of betel nut and lime.

MATERIALS AND METHODS.

The types and degrees of attrition were studied on plaster models from the adults of three villages. Broca's classification¹² of the degree of occlusal attrition was used. This contains four classes:

- (i) enamel worn, but without cusp-obliteration or exposure of dentine;
- (ii) cusps worn down and the dentine exposed;
- (iii) a large portion of the crown of the tooth worn away;
- (iv) most of the crown disappeared and the wear extended to the neck of the tooth.

The attrition was in general assessed on the state of the posterior teeth because Broca's classification describes the stages as they occur on these particular teeth. Admittedly the personal factor cannot be eliminated from the assessment of degrees of wear on any such basis, but no better method is available.

¹²Broca, P.—Instructions relatives a l'etude anthropologique du systeme dentaire, Bull.Soc.Anthrop.Paris, 2:128 (149), 1879. (Cited by Shaw, J. C. M.—The teeth, the bony palate and the mandible in Bantu races of South Africa, London, p.53, 1931.)

RESULTS.

Figs. 14-19 illustrate examples of the attrition observed. Table 6 (subjects in different age-groups classified according to degree of attrition) shows that:

- (i) all natives of more than 30 years of age had attrition of the posterior teeth;
- (ii) the attrition seen in middle-aged and older people was frequently of degrees II and III, degrees which in our experience are rarely seen in white people living on a "civilised diet" (possibly due to the fact that many white people have already lost their teeth by the time they reach middle life);
- (iii) no subjects were seen who showed pulp-exposure caused by extensive and too rapid attrition.

The amount of approximal attrition is always very difficult to assess; we observed it frequently in some old subjects (figs. 17 and 18).

Campbell* (*loc. cit.*, p. 66) has described a complex direction of wear on the molars of Australian Aborigines, and this was particularly sought on the models of the New Guinea natives. Its chief feature is that, when the occlusal surfaces become worn, all the cusps of the teeth are not equally affected.

TABLE 6
Subjects in Different Age-Groups classified according to Degree of Attrition.

Approx. Age (years)	Degree of Attrition				
	None	I (slight)	II (moderate)	III (moderately severe)	IV (severe)
Pâtep II					
16-29	6	33	3	0	0
30-44	0	12	8	0	0
45 and over	0	1	8	2	1
Totals	6	46	19	2	1
Kavataria					
16-29	0	3	1	0	0
30-44	0	1	4	0	0
45 and over	0	0	2	2	0
Totals	0	4	7	2	0
Korovagi					
16-29	0	4	2	0	0
30-44	0	0	6	7	0
45 and over	0	0	0	3	0
Totals	0	4	8	10	0

On the lower first molar the buccal cusps, particularly the mesiobuccal, are worn more rapidly than the lingual cusps. On the corresponding maxillary molar the lingual cusps (especially the disto-lingual) become worn more than the buccal cusps. The third molars usually exhibit exactly the reverse direction of wear, and the second molars show a fairly horizontal and therefore intermediate direction of attrition.

This complex direction of wear occurred frequently in the middle-aged and older natives of New Guinea; the best examples were seen in Kavataria and Korovagi (figs. 20 and 21).

Campbell believes that this direction of wear is due to the fact that in the first molar region the upper arch is wider than the lower, whereas in the third molar region the upper arch is narrower than the lower. This is probably the case in many of the New Guinea natives, because a lot of models show a cross bite of the third molars. However, third molars usually erupt in such a manner that the occlusal surface of the upper is facing somewhat buccally and that of the lower in a corresponding direction lingually. Thus wear does not alter the angulation of the occlusal surface of this tooth; it rather retains it.

DISCUSSION.

For a discussion of the possible relationships between attrition and periodontitis and between attrition and dental caries see Parts VI and VII of this paper.

SUMMARY AND CONCLUSIONS.

1. All natives over 30 years of age showed attrition of the occlusal surfaces of the teeth, which in later years was more advanced than that usually seen in white people of the same age.
2. Approximal attrition was frequently present in the mouths of the older people.
3. Attrition certainly had no effect in preventing periodontitis and may possibly have increased it, although there are other probable causes of the periodontal conditions which were so prevalent (Part VI).
4. The attrition appeared to act as a caries-preventing factor, except possibly in the case of one type of dental caries in some subjects over 45 years of age at Pātep II.

PART V.

OCCLUSION.

INTRODUCTION.

In any study of deviations from the normal it is necessary to have a clear conception of what is to be considered as normal. To a certain extent normal occlusion can be defined in terms of anatomical relationships; but a number of writers on the subject, such as Hellman¹³, Johnson¹⁴ and Hemley¹⁵, prefer to define it in terms of function. They consider that the occlusion is normal when the teeth perform efficiently their part in mastication, speech, deglutition and aesthetics, and also when the arrangement is such that the health of the supporting tissues is maintained. Always associated with normal occlusion are harmonious growth and development of related bones, muscles and other tissues.

¹³Hellman, M.—Variation in occlusion, *Dent.Cosmos*, 63:608, 1921.

¹⁴Johnson, A. L.—Basic principles of orthodontia, *Dent.Cosmos*, 65:379, 1923.

¹⁵Hemley, S.—Fundamentals of occlusion, Philadelphia and London, Chap.1, 1944.

Strang¹⁶ considers that for the occlusion to be normal there must simultaneously co-exist (i) correct approximal contacts and axial position of all teeth, (ii) a normal relationship of the inclined planes of the occlusal surfaces of the teeth when the jaws are closed and (iii) normal growth, development, location and correlation of the various associated tissues and parts. This definition has been used in the present study.

In white races at the present day departures from normal occlusion are common and also frequently severe; one survey among the children of Wisconsin (Foster¹⁷) showed that 49% had malocclusion, another in Michigan (Moore¹⁸) 29%.

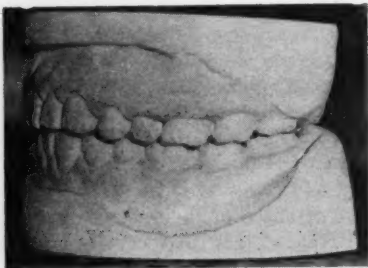


Fig. 22.

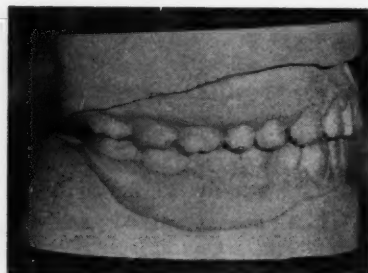


Fig. 23.

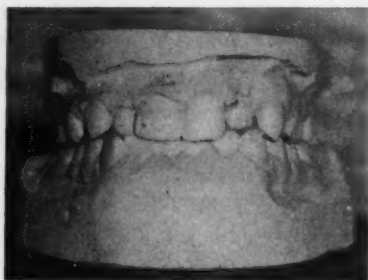


Fig. 24.



Fig. 25.

On the other hand, native races living in their primitive state have frequently been reported as having well-developed arches and jaws and normal occlusion in a high percentage of the population (Price¹⁹, Webb⁹, Waugh²⁰). In addition there is evidence that among civilised natives malocclusion approaches in incidence and in severity that observed in white races (Price¹⁹, Waugh²⁰).

¹⁶Strang, R. H. W.—A textbook of orthodontia, Philadelphia, p.24, 1943.

¹⁷Foster, L. W.—Dental conditions in White and Indian children in northern Wisconsin, J.Amer.Dent.Ass., 29:2251, 1942.

¹⁸Moore, G. R.—The orthodontic program of the Michigan State Department of Health with a new classification of occlusion for surveying purposes, Amer.J.Orthod., 34:355, 1948.

¹⁹Price, W. A.—Nutrition and physical degeneration, California. Fourth printing.

²⁰Waugh, L. M.—Influence of the diet on the jaws and face of the American Eskimo, J.Amer.Dent.Ass.Dent.Cosmos, 24:1640, 1937.

In view of the prevalence of these occlusal disharmonies in certain groups every effort should be made to elucidate further their nature and causes so that more effective measures may be taken for prevention and cure. For the attainment of this end epidemiological surveys seem essential.

Because the objects of the dental section of the Nutrition Survey were primarily to collect data on dental caries and oral bacteriology, it was not practicable in the time available to secure craniometric data, lateral radiograms or gnathostatic models.

LOCATION, SUBJECTS, MATERIAL AND METHODS.

Impressions were taken in composition and plaster models were made by a native laboratory technician specially instructed in this work. In a few of the elderly subjects (who had lost some of their teeth) drifting of adjacent or opposing teeth had occurred to such an extent that it was difficult to tell what the original state of the occlusion had been; they were not included in this study.

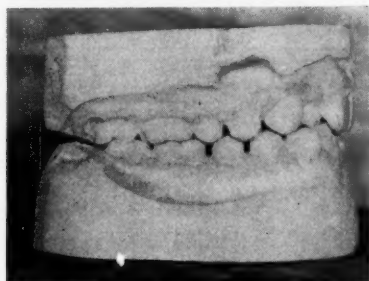


Fig. 26.



Fig. 27.

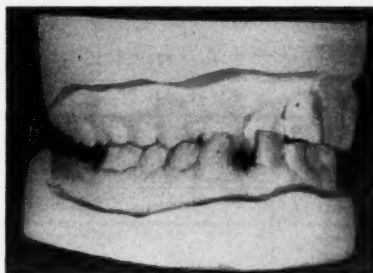


Fig. 28.



Fig. 29.

In Pätep II models from 77 persons were prepared and classified, but in Kavataria and Korovagi lack of time limited the numbers to 17 and 20 respectively. There was no conscious bias in the selection of subjects.

The models were classified into those possessing normal occlusion (as defined by Strang) and those showing malocclusion. Those showing malocclusion were

arranged according to Angle's classification²¹. Class 1 has been further subdivided (i-v) in a manner similar to that of Dewey and Anderson²². Our classification contains however two further subdivisions: type vi: deep overbite (upper incisors overlapping lower by half or more) unaccompanied by any other form of malocclusion; and type vii: miscellaneous, congenital abnormalities in tooth-size, etc. In Class 1 cases, where a model showed more than one of the abnormalities described, it was listed under that which was most obvious.

RESULTS.

The figures (12, 22-41) show examples of the various occlusions seen (normal and abnormal).

Table 7 shows the number and percentage of individuals with each type of malocclusion. Table 8 compares our own results with those of other observers of various population-groups.

TABLE 7
Classification of Types of Occlusion Observed in New Guinea Natives.

Types of Occlusion	Number of subjects (% in brackets)		
	Pātep II	Kavatara	Korovagi
Normal	43 (55.84)	15 (88.23)	5 (25.0)
Class 1			
type i (bunched or crowded incisors) ...	4 (5.19)	0 (0.0)	3 (15.0)
type ii (protrusion of upper incisors) ...	0 (0.0)	0 (0.0)	0 (0.0)
type iii (one or more upper incisors locked behind lowers)	11 (14.29)	0 (0.0)	1 (5.0)
type iv (molars alone or molars and premolars malposed buccally or lingually)	3 (3.90)	0 (0.0)	1 (5.0)
type v (mesial drifting of molars resulting from premature loss of teeth)	0 (0.0)	0 (0.0)	0 (0.0)
type vi (deep overbite: upper incisors overlapping lower by half or more)	9 (11.69)	0 (0.0)	7 (35.0)
type vii (miscellaneous: congenital abnormalities in tooth-size, etc.)	4 (5.19)	2 (11.77)	1 (5.0)
Class 1 (Totals)	13 (40.26)	2 (11.77)	13 (65.0)
Class 2			
Division i	0 (0.0)	0 (0.0)	0 (0.0)
Division ii	2 (2.60)	0 (0.0)	0 (10.0)
Class 2 (Totals)	2 (2.60)	0 (0.0)	2 (10.0)
Class 3	1 (1.30)	0 (0.0)	0 (0.0)
Totals	77	17	20

Because of the small number of subjects in certain divisions of the classification and also because the data for the different populations have been collected by different examiners, a statistical analysis is not possible in all instances.

²¹Angle, E. H.—Malocclusion of the teeth, Philadelphia. 7th ed., 1907.

²²Dewey, M. and Anderson, G. M.—Practical orthodontics, St. Louis, p.107, 1942.

TABLE 8
Occlusion Observed in Different Populations.

Types of Occlusion	New Guinea native population (9 yr. and over)		Wisconsin white children (Foster ¹⁷)		Wisconsin Indian children (Foster ¹⁷)		India: Hindu Moslem and Sikh High Schoolboys (Day and Tandan ²²)*		Sydney: Patients presenting in private orthodontic practice (Benson ²³)†		Britain: Air crew personnel of R.A.F. (Harvey ²⁴)‡	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal	63	55.26	96	51.0	147	53.7	377	49.74	—	—	8	0.80
Class 1	46	40.35	52	27.7	83	30.3	203	26.85	109	—	794	79.40
Class 2	0 4	0 3.51	34	18.1	31	11.3	166	22.09	{ 82 15	— —	97 44	9.70 4.40
Div. I Div. II												
Class 3	1	0.88	6	3.2	13	4.7	10	1.32	21	—	57	5.70
Total ...	114	100.0	188	100.0	274	100.0	756	100.0	227	—	1000	100.0

* Numbers calculated from percentages given in reference.

† Percentages not given, as the group is a selected one, i.e., it contains no subjects with normal occlusion.

‡ This author probably used a stricter criterion for normal occlusion than the present writers.

ANALYSIS OF RESULTS.

(1) From figures 24-41 it is apparent that the typical malocclusions observed in New Guinea natives are not nearly as severe as those commonly observed in white children.

(2) The proportion of people having normal occlusion is similar in four of the different population-groups included in table 8, but is much lower in the British group. However, the standards employed by the different observers may not have been identical.

(3) The New Guinea natives have a higher percentage of class 1 malocclusion than have any of the other groups (table 8). In table 9 the number of subjects with Class 1 malocclusion is shown for (a) the New Guinea group, and (b) the Wisconsin group of white children:—

TABLE 9
Class 1 Malocclusion.

	Natives (New Guinea)	White children (Wisconsin)
No. of subjects with Class 1 malocclusion ...	46	52
Remainder of Group ...	68	136
Totals ...	114	188

 $\chi^2 = 5.21$: significant*

*Day, C. D. M. and Tandan, G. C.—The incidence of dental caries in the Punjab, Brit.Dent.J., 69:381, 1940.

*Benson, W. N.—Standardised radiography in orthodontic case analysis, Pt. II, Dent.J.Aust., 19:435, 1947.

*Harvey, W.—Investigation and survey of malocclusion and ear symptoms, with particular reference to otitic barotrauma (pain in the ear due to change in altitude), Brit.Dent.J., 85:219, 1948.

Thus there is a significantly greater number with class 1 malocclusion in the New Guinea group than in the white children of Wisconsin.

(4) The New Guinea natives have a much lower incidence of class 2 malocclusion than any of the other population-groups (table 8).

Table 10 shows the figures for Class 2 malocclusion for (a) the New Guinea group and (b) the Wisconsin group:—

TABLE 10
Class 2 Malocclusion.

	Natives (New Guinea)	White Children (Wisconsin)
No. of subjects with Class 2 malocclusion	4	34
Remainder of Group	110	154
Totals	114	188

$\chi^2 = 13.7$: significant.

Here again the difference in incidence is statistically significant, but in contrast to the incidence of class 1 malocclusion that of class 2 malocclusion is greater in the white children.

(5) Only one case of class 3 malocclusion was observed in New Guinea and even then there was some doubt as to its being a true example of this type of malocclusion. However, assuming that it was, the New Guinea natives still show a lower incidence than any of the other groups, but the difference between the New Guinea natives and the white children of Wisconsin is not statistically significant (table 11).

TABLE 11
Class 3 Malocclusion.

	Natives (New Guinea)	White Children (Wisconsin)
No. of subjects with Class 3 malocclusion	1	6
Remainder of Group	113	182
Totals	114	188

$\chi^2 = 1.68$: not significant.

*Throughout this paper the level of significance used is 5%.

(6) Referring to table 7 and figs. 12, 24-41, it can be seen that there were no natives with protruding upper incisors and/or an anterior open bite, nor were there any showing the narrow high palate and crowding of anterior teeth to the degree which is sometimes seen in white children.

(7) The proportion of people with palatoversion of upper incisors seems high in Pâtep II. In any one individual usually only one or two teeth were thus affected. In several instances a tooth was rotated and in palatoversion

to only one of its lower antagonists, usually the more distal, as in figs. 25 and 28. There did not seem to be any particular pattern predominant, and out of 19 teeth affected the frequency for the individual teeth was as follows:—

	CUSPID	LATERAL INCISOR	CENTRAL INCISOR	CENTRAL INCISOR	LATERAL INCISOR	CUSPID	
left	2	6	0	2	6	3	right

(8) In the children and young adults there were no cases of mesial drifting of molars resulting from loss of teeth mesial to them, because due to the low incidence of dental caries premature loss of deciduous teeth practically never occurred, and loss of permanent teeth before middle age was rare.

(9) The number of subjects with a deep anterior overbite (upper incisors overlapping lower by half or more) seems very large in Korovagi (35%). This class of abnormal occlusion would strongly predispose to trauma of the anterior periodontal tissues, unless it were accompanied by steep posterior cusp-inclination. That this compensating factor was not generally present in Korovagi is shown in the section on attrition (Part IV), where it is mentioned that in this village the posterior teeth lost their cusps within 10-15 years of eruption. (It is highly probable that the attrition of the cusps of the posterior teeth—brought about by frequent chewing of betel nut and lime—even if not the basic cause, is at least an important contributory factor in this type of malocclusion.)

To illustrate the degrees of anterior overbite, as shown by the plaster models of all the subjects of the groups, the vertical relationship of upper and lower incisors is set out in table 12, which indicates the presence and/or amount of overbite independent of the type of occlusion (normal or otherwise).

TABLE 12
Vertical Relationship of Upper and Lower Incisors.

Vertical Relationship	Number of subjects (% in brackets)		
	Pātep II	Kavataria	Korovagi
1. open bite	0	0	0
2. edge-to-edge bite	1	2	2
	38	12	6
	(649.35)	(70.59)	(30.0)
3. slight overbite (upper incisors overlapping lower by less than 1/3)	37	10	4
4. moderate overbite (upper incisors overlapping lower by less than 2/3)	25	4	10
	34	4	14
	(44.16)	(23.53)	(70.0)
5. deep overbite (upper incisors overlapping lower by more than 2/3)	9	0	4
6. not classified	5 (6.49)	1 (5.88)	0 (0.0)

This table shows a difference between Kavataria and Korovagi in respect of the relative distribution of those subjects exhibiting edge-to-edge bite or slight overbite on the one hand and those with moderate or deep overbite on the other hand.

(10) No instances of Class 2, division i, malocclusion were observed in the New Guinea natives.

DISCUSSION.

1. Malocclusion due to disharmony between the size of the teeth and jaws was extremely rare. There were 8 people with impaction but none with severe overcrowding.



Fig. 30.



Fig. 31.



Fig. 32.

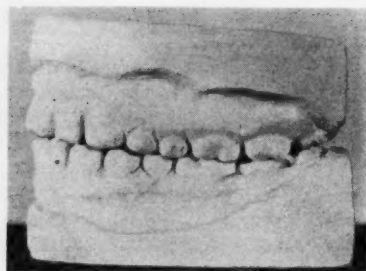


Fig. 33.

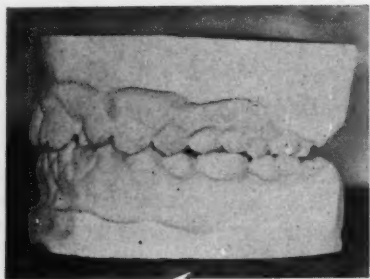


Fig. 34.

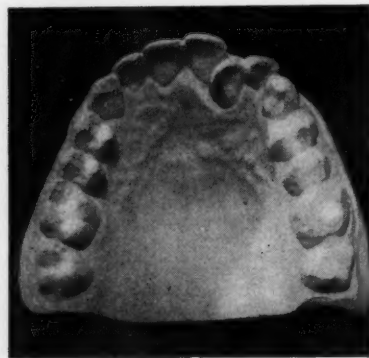


Fig. 35.

The high incidence of malocclusion of this type in modern white races has been attributed to several causes, which fall into two broad divisions: (A) those associated with heredity and (B) those associated with the environment.

A. *Heredity* may be regarded as having at least two aspects: (a) a general, inherent developmental or evolutionary tendency or pattern and (b) a modification of the established racial heredity-pattern by racial intermarriage.

(a) In the development of primates the facial bones appear to be decreasing in size relative to the cranium and (what is of more immediate significance) it

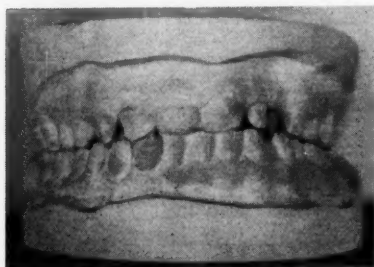


Fig. 36.

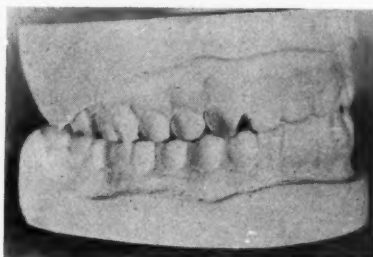


Fig. 37.



Fig. 38.

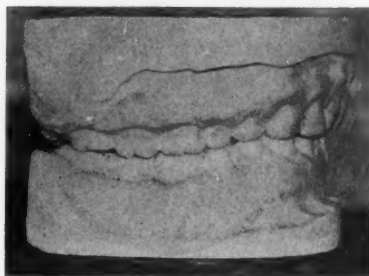


Fig. 39.

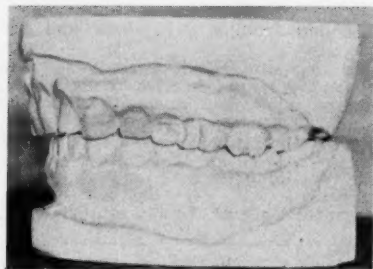


Fig. 40.

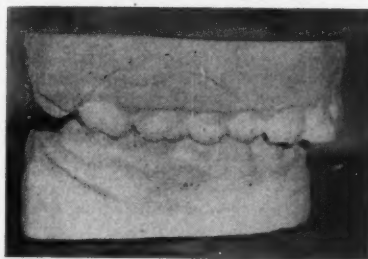


Fig. 41.

appears that the phylogenetic reduction in total mesio-distal tooth-dimension is proceeding more slowly than the reduction in the size of the dental arches (Henry²⁶).

However among the New Guinea peoples (as has been shown in the section on Developmental Aberrations) reduction in the total mesio-distal dimension of the teeth seems to be taking place at least to the same extent as the assumed reduction in the length of the arches. The number of diminutive and congenitally absent teeth, 34*, was almost twice that, 19, of impacted and supernumerary teeth. On the other hand, in a group of white Australian students (Lilienthal⁶)



Fig. 42.



Fig. 43.

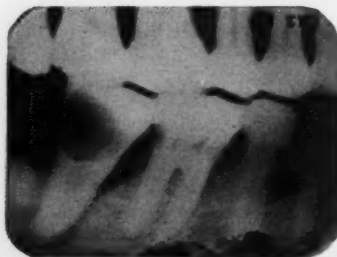


Fig. 44.



Fig. 45.

the number of congenitally absent teeth, 30, was only one-third the number, 97, of impacted and supernumerary teeth.

(b) In small isolated groups of native peoples the incidence of malocclusion is low, possibly because the people are descended from a pure stock and are

*Before regarding the absence of a tooth as a congenital defect, account was taken of the possibility or likelihood that its absence was the result of caries or periodontal disease and congenital absence was not accepted as established, unless the following requirements were met:

- (i) failure to obtain a history of the presence at any time of a tooth at the site concerned;
- (ii) very slight or no bone-loss around the remaining teeth;
- (iii) absence of caries from the remaining teeth;
- (iv) absence of radiological evidence of unerupted teeth at the site concerned.

²⁶Henry, C. B.—Prophylactic odontectomy of the developing mandibular third molar, *Amer.J.Orthod.Oral Surg.*, 24:72 (76), 1938.

comparatively inbred (Davenport²⁷). However, over the last few centuries, interbreeding between racially distinct peoples, as in the United States of America and South America, for example, has occurred on a scale hitherto unknown. For animals at least, and it is conceivable that this may apply to human beings, Stockhard's studies (Johnson²⁸) have shown that gross disharmonies may be present in hybrid offspring. For example, the animal may inherit small bones from one parent and large teeth from the other; or it may inherit the upper jaw from one stock and the lower jaw of different or heterologous type from the other stock. In New Guinea, in the main, the native peoples married only within their own linguistic group. Migration or opportunities for meeting other racial groups are still small compared to those existing among white races today.

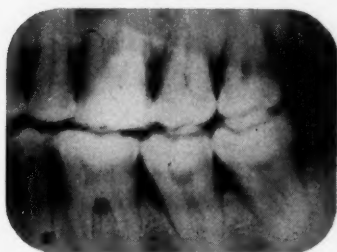


Fig. 46.



Fig. 47.

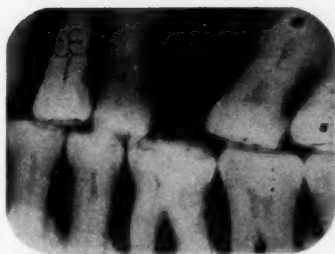


Fig. 48.



Fig. 49.

B. Environment. Those who believe that malocclusion is more frequently caused by environmental factors have as their main supporting argument the fact that for structures (such as bones) to attain their maximal potential growth and development it is necessary that they have adequate function. The softness of many modern foods renders unnecessary the exercise of the jaw's primary

²⁷Davenport, C. B.—The effects of race intermingling, *Proc.Amer.Phil.Soc.*, 56: 364, 1917.

²⁸Johnson, A. L.—Studies in genetics of interest to the orthodontist, *Int.J.Orthod.*, 19, 273, 1933. (Cited by Fairbank, L. C.—The influence of recent research on the present etiological concept of malocclusion, *Amer.J.Orthod.*, 34:192, 1948.)

function, that of mastication. Therefore, the jaws do not achieve their maximal potential size and in consequence the teeth are crowded (Klatsky²⁹).

The report of the nutritionists in the Nutrition Survey party shows that food eaten by the natives varied greatly in consistency much as does our own.



Fig. 50.



Fig. 51.

At the same time there is a great difference between the native and the European in the manner of eating: the native places in his mouth very large pieces of food or else bites a big mouthful from a tuber or sago-stick; this contrasts sharply with the European habit of cutting food into small pieces. Indeed, the native's teeth perform many of the tasks for which we use knives and forks, nutcrackers, mincing machines and rolling mills.

Another alleged cause of crowding, namely mesial drifting of first permanent molars due to premature loss of deciduous teeth, did not exist in any of the three villages visited.

²⁹Klatsky, M.—Studies in the dietaries of contemporary primitive peoples, J.Amer.Dent.Ass., 36:385, 1948.

To sum up: the genetic factors which control the size of teeth and jaws in New Guinea seem to be in harmony; furthermore, the uses to which the masticatory apparatus is put seem sufficient to induce the maxilla and mandible to attain their maximal growth potential.

2. No cases of Class 2, Division 1, malocclusion were seen in New Guinea. In white children this type of malocclusion is usually associated with subnormal bodily development, hypertrophied adenoids and tonsils, mouth-breathing and a forward position of the head of the condyle in relation to the ramus. Previously it was believed that the respiratory dysfunction caused the malocclusion



Fig. 52.

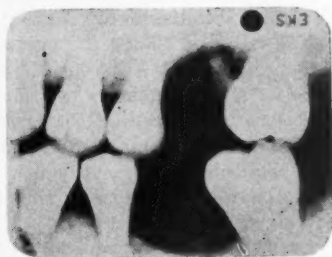


Fig. 54.



Fig. 53.

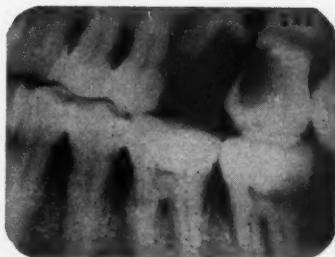


Fig. 55.

but it may be that the two conditions are associated because of gene-linkage (Wylie³⁰). However, the medical officer-in-charge³¹ of the Nutrition Survey party has stated that he saw no cases of mouth-breathing among the children examined in New Guinea.

3. Only one instance of Class 3 malocclusion was encountered in New Guinea natives. This type of malocclusion is generally believed to be inherited; if so, then the genetic factors which produce this malocclusion are rare among these people.

4. Anterior open bites coupled with protrusion of upper incisors were not seen: this is the type of deformity sometimes alleged to be caused by the persisting of thumb- or finger-sucking, tongue-thrusting, etc. To the best of our knowledge such habits are not practised by New Guinea children.

It may be possible that the feeding-practice of the New Guinea mothers gives their infants a more complete satisfaction, so that there is no need or desire to acquire these habits. Their feeding-practice differs from that in civilised societies mostly in that there are no regular times for feeding and the child is never denied the breast; moreover some breast-feeding continues until the infant reaches the age of about 18 months.

5. A large number of people in Pâtep II have one or more of their upper incisors locked behind the lowers. Due to incompleteness of the data on the familial relationship of the peoples in the village and the fact that there was no particular pattern in which the teeth were affected, we are able to suggest only one possible cause of this condition, namely, that the deciduous teeth were retained too long.

6. There were several unusual types of malocclusion which occurred in isolated instances, e.g., that shown in figs. 36-38. Because of their apparently idiopathic nature and the fact that they were isolated cases, we can make no comment on their aetiology.

SUMMARY AND CONCLUSIONS.

Malocclusion was observed as frequently in New Guinea natives as in a group of white children in Wisconsin (approximately 50%) but in very few of the New Guinea natives was the condition severe. Class 1 malocclusion was more frequent, Class 2 less frequent, in New Guinea natives than in the white children. The commonest types of malocclusion seen were in Korovagi a deep anterior overbite, and in Pâtep II, one or more upper incisors locked behind the lower incisors.

PART VI.

PERIODONTAL CONDITIONS.

The Egyptian peasants are reported³² to have an extremely high incidence of periodontal disease, the Australian Aborigines (Campbell³³ *loc. cit.*, p. 153) show conditions similar to those of civilised races and in the Eskimos of

³⁰Wylie, W. L.—Heredity and the orthodontist, *Amer.J.Orthod.Oral Surg.*, 33, Oral Surg., 155, 1947.

³¹Hipsley, E. H.—Private communication, 1949.

³²Dawson, C. E.—Dental defects and periodontal disease in Egypt, 1946-47, *J.Dent.Res.*, 27:512, 1948.

³³Campbell, T. D.—Food, food values and food habits of the Australian Aborigines in relation to their dental conditions, *Aust.J.Dent.*, 43:1, 1939.

Greenland (Pederson³⁴) generalised periodontal disease is non-existent, even though gingivitis is common. The periodontal conditions of uncivilised and primitive races living on their native diets thus vary greatly in different parts of the world.

It was therefore considered of interest to examine the periodontal tissues of the New Guinea natives as fully as possible in the time available, not only in view of these racial differences but also because periodontal tissues to a certain extent reflect general health and nutrition (Schour & Massler³⁵), and in addition there are some reports showing that dental caries and periodontitis may sometimes be inversely related (Mann et al.³⁶, Schwartz³⁷, Dreizen & Spies³⁸, Corkill³⁹).

METHODS OF EXAMINATION AND CLASSIFICATION.

Subjects were examined clinically with a mirror and probe, and also radiographically. Three films were used for the upper anterior teeth and one bitewing film on each side for the posteriors. Two sets of data are therefore available, namely clinical and radiographical. Because the personal factor is liable to lead to variation in the clinical assessment of severity, we have not used clinical criteria for purposes of classification of degrees of severity. A description based on the clinical features is, however, included for the sake of completeness.

In tabulating the results we have included for each village all the adults for whom radiograms were available: namely 80 of 87 in Pātep II, 55 of 60 in Kavataria and 55 of 63 in Korovagi.

We divided the subjects into three groups:

Group 1: includes (a) subjects with grades of the disease detectable clinically but not severe enough to produce discernible bone-loss and (b) subjects with apparently normal periodontal tissues.

Group 2: loss of bone ranging from one or two small pockets (fig. 42) to a widespread and general loss (figs. 43 and 44). Those showing very slight loss of bone at the bifurcation of the roots of one or two of the molars were the upper limit of this degree of the disease.

Group 3: extensive general bone-loss greater than that in group 2, sometimes associated with exfoliation of the teeth and obvious loss of bone at the bifurcation of the roots of more than two of the molars (figs. 45-49).

RESULTS.

Clinical. In all three New Guinea villages the clinical appearance of the gingivae of the children was almost invariably healthy and this also applied to most of the adolescents and young adults; but in the middle aged and older people we frequently observed a condition the clinical features of which were similar to those of Gottlieb's "Schmutz-pyorrhoea"⁴⁰ (*loc. cit.*, p. 104). The

³⁴Pederson, P. O.—Dental investigations of Greenland Eskimos, *Proc.roy.Soc.Med.*, 40:726, 1947.

³⁵Schour, I. and Massler, M.—The effects of dietary deficiencies upon the oral structures, III, *J.Amer.Dent.Ass.*, 32:1022, 1945.

³⁶Mann, A. W., Dreizen, S., Spies, T. D. and Hunt, F. M.—A comparison of dental caries activity in malnourished and well-nourished patients, *J.Amer.Dent.Ass.*, 34:244, 1947.

³⁷Schwarz, J.—The teeth of the Masai, *J.Dent. Res.*, 27:17, 1946.

³⁸Dreizen, S. and Spies, T. D.—Some observations on the association of the products of protein putrefaction with dental caries activity, *J.Dent.Res.*, 26:409, 1947.

³⁹Corkill, N. L.—Pellagra in Sudanese millet-eaters, *Lancet*, 226:1387, 1934.

⁴⁰Gottlieb, B. and Orban, B.—Biology and pathology of the tooth and its supporting mechanism, New York, 1938.

same condition has also been described by Thoma under the title of "Generalised Marginal Periodontitis"⁴¹. It appeared to be the same disease in each village, though present in slightly different degrees. Although the clinical features were the same as those of the conditions mentioned above, at the present juncture we do not feel justified in accepting without reservation Gottlieb's and Thoma's opinions on the aetiology of the condition. In subjects examined by us:—

(i) the degree of inflammation varied: at times it was severe and in these cases the gingivae were swollen, soft, shining and haemorrhagic with rounded and everted interdental papillae; in other instances the gingivae were normal in colour and tone, but nevertheless showed extensive recession, and between these two extremes all variations were seen.

(ii) the periodontal pockets were not restricted to any particular site and their depth varied.

(iii) heavy deposits of both sub- and supra-gingival calculus were almost invariably associated with the condition.

(iv) recession of the gingival tissues occurred and in more advanced cases a considerable area of cementum was exposed. It is frequently stated that recession of the periodontal tissues is a normal physiological process associated with advancing age, and in ideal circumstances compensates for the normal attrition of the occlusal surfaces of the teeth. However, these natives often showed recession and bone-loss quite out of proportion to the amount of tooth-substance lost by attrition. The result of this was that the amount of tooth visible above the gum margin was greatly increased as the disease progressed. Thus the leverage by the extra-alveolar part of the tooth during masticatory movement was increased and threw an additional strain on the supporting tissue (figs. 50-53).

We saw no cases of Vincent's Infection, although medical assistants in the areas visited said that it does occur in sporadic outbreaks; nor were any subjects seen who presented the clinical signs associated with blood dyscrasias and endocrine disturbances.

Radiographical. The results based on the radiographical evidence are set out for each village separately. Tables 13, 14 and 15 are self-explanatory.

TABLE 13
Population of Pâtep II grouped according to the Periodontal Condition.

Approx. Age (years)	Number of persons in each group			Total (% in brackets)
	1 no loss	2 moderate loss	3 extensive loss	
16-29	male 12 female 20	male 6 female 5	male 0 female 0	43 (53.75)
30-44	male 2 female 3	male 4 female 9	male 4 female 0	22 (27.50)
45 and over	male 0 female 1	male 4 female 9	male 1 female 0	15 (18.75)
Total No. persons	38 (47.50)	37 (46.25)	5 (6.25)	80 (100.0)

⁴¹Thoma, K. H.—Oral pathology, 2nd ed., St. Louis, p.706, 1944.

TABLE 14
Population of Kavataria grouped according to the Periodontal Condition.

Approx. Age (years)	Number of persons in each group			Total (% in brackets)
	1 no loss	2 moderate loss	3 extensive loss	
16-29	male 6 female 8	male 2 female 1	male 1 female 0	18 (32.73)
30-44	male 0 female 3	male 9 female 3	male 5 female 5	25 (45.45)
45 and over	male 0 female 0	male 0 female 1	male 9 female 2	12 (21.82)
Total No. Persons	17 (30.91)	16 (29.09)	22 (40.0)	55 (100.0)

TABLE 15
Population of Korovagi grouped according to the Periodontal Condition.

Approx. Age (years)	Number of persons in each group			Total (% in brackets)
	1 no loss	2 moderate loss	3 extensive loss	
16-29	male 3 female 6	male 1 female 3	male 1 female 2	16 (29.09)
30-44	male 0 female 3	male 7 female 7	male 9 female 0	26 (47.27)
45 and over	male 1 female 0	male 5 female 0	male 5 female 2	13 (23.64)
Total No. persons	13 (23.64)	23 (41.82)	19 (34.55)	55 (100.0)

DISCUSSION.

In Pătep II, Kavataria and Korovagi respectively, 52.50, 69.09 and 76.37 per cent. of the adult population exhibited loss of alveolar bone caused by periodontitis; the incidence of this disease is therefore very high. In middle and old age many of the population show stages of the disease which would, according to current concepts, probably be considered as detrimental to the health of the body as a whole.

The causes of such widespread and progressive disease are difficult to determine. Although the clinical manifestations were similar among the people of each village, the incidence and severity of the condition were less in Pătep II than in the other two villages. It is not unlikely that the contributing causes may be different in each district.

Many factors have been mentioned by different workers as being causally associated with periodontitis and of these most can be related, even if only indirectly, to the diet and food habits; for convenience of presentation they are discussed in that manner below.

A. Nutritional Quality of Food. The two nutrients whose lack is frequently associated with periodontal disease are vitamin B₂ complex and vitamin C, although practically all other known nutrients have at different times been incriminated by various authors.

(i) Lack of vitamin B₂ complex. Reports show that endemic pellagra is associated with a high incidence of certain types of periodontitis and stomatitis^{36, 38} (*loc. cit.*, p. 249; *loc. cit.*, p. 418). However, the medical officer in charge of the survey party reported⁴² that none of the other signs (e.g., abnormalities of the tongue, dermatitis, pigmentation of the skin of the extremities) indicative of niacin deficiency were seen.

(ii) Lack of vitamin C. Evidence that lack of this vitamin may predispose to gingivitis and periodontal disease has come from several sources (Burrill⁴³, Fitzsimmons⁴⁴). However, as indicated in the report of the New Guinea Nutrition Survey Expedition, in all three villages, with the possible exception of Kavataria, the intake and utilisation of ascorbic acid was satisfactory.

B. Stimulatory and Detergent Quality of Food. For the maintenance of periodontal health it is essential that the diet be sufficiently tough and fibrous (i) to stimulate and promote keratinisation of the gingival tissue (Pelzer⁴⁵) and (ii) to keep the teeth free from sub- and supra-gingival calculus. Although other factors may predispose, the injury caused by calculus seems likely to be the exciting cause in periodontitis (King⁴⁶).

From the Nutritionist's report⁴² (New Guinea Nutrition Survey) it would appear that the periodontal tissues of the New Guinea natives are subjected to at least as much natural stimulation and cleansing as are those of an average member of a civilised community. Their food varies in consistency, much as does our own, from the tough and fibrous yams and coconut to sago soup and cooked green leaves, which are soft and pulpy. But in addition their teeth perform many tasks for which we use other tools, e.g., stripping the outer layer from a piece of sugarcane; and the manner in which they bite a large mouthful from a tuber or sago stick is very different from the way in which our food is well cut up and eaten in small pieces. However, it is impossible to speak in other than general terms because the physical characteristics of food are difficult to define and assess on a quantitative basis and satisfactory data are therefore not available.

In white races tooth-brushing may perform some of the functions of a tough diet, but in New Guinea the only attempt seen at cleaning the teeth was at Pâtep II. In all three villages the mouths of the children were usually clean, and the teeth free from food debris and calculus, although they were sometimes stained. In Pâtep II the labial and buccal surfaces of the teeth of the adults were kept clean by rubbing with sand, but in the men the approximal and lingual surfaces were generally covered with a layer of adherent debris stained red-brown from chewing betel nut or smoking tobacco.

³⁶Commonwealth of Australia, Department of External Territories.—The report of the New Guinea Nutrition Survey Expedition, 1947. In the Press.

³⁸Burrill, D. Y.—Relationship of blood plasma vitamin C level to gingival and periodontal disease, *J.Dent.Res.*, 21: 353, 1942.

⁴⁴Fitzsimmons, L. J.—Vitamin C deficiency, a cause of periodontal disease, *J.Amer.Dent.Ass.*, 28:76, 1941.

⁴⁵Pelzer, R. H.—A study of the local oral effect of diet on the periodontal tissues and the gingival capillary structure, *J.Amer.Dent.Ass.*, 27:13, 1940.

⁴⁶King, J. D.—Experimental investigations of parodontal disease, IV, *Brit.Dent.J.*, 82:61, 1947.

At Kavataria darkly stained debris and large amounts of sub- and supra-gingival calculus were nearly always present in the mouths of the adults. Black teeth were considered an asset and frequently some form of permanent stain was applied to make them appear darker. The use of lime as a co-masticatory of betel nut very probably contributed towards the large deposits of calculus which were almost always present (figs. 50 and 51).

In Korovagi the oral hygiene of the adults (fig. 52) was equally as unsatisfactory as in Kavataria; betel nut was more plentiful and was chewed extensively by men, women and sometimes even children. Thus it would appear that the detergent qualities of the diet are quite insufficient (for the adults at least) to overcome the effect of betel nut chewing and of the lack of artificial cleansing, except possibly in Pātep II.

C. Attritional Effects of Food-Habits. (a) Occlusal attrition. From a survey of the literature it seems that there is a lack of agreement as to what degree of attrition of the teeth is necessary or helpful in maintaining the health of the tissues surrounding the teeth.

If attrition is too rapid and too severe other pathological effects follow. Normally, as wear takes place on the occlusal surfaces of the teeth, secondary dentine is laid down in the corresponding part of the wall of the pulp chamber, so that, when attrition has reached that level, the pulp will have receded rootwards behind its protective layer of secondary dentine. When attrition is too rapid, the secondary dentine cannot be laid down quickly enough and the dental pulp will be exposed. This then becomes infected and necrotic and rarefying osteitis or an apical abscess and some of its sequelae develop in the alveolar bone. Such excessive degrees of wear have been observed in certain surviving and prehistoric native races. Rabkin⁴⁷ has seen it among prehistoric American Indian tribes, who presumably prepared their food in such a way that a lot of sand and grit was incorporated; Campbell⁴ (*loc. cit.*, p. 79) found evidence of it in 35 out of 47 skulls of aged Australian aborigines.

Miller⁴⁸ and Box⁴⁹ seem to consider that the wearing away of the buccal cusps of the lower teeth and of the lingual cusps of the upper teeth necessitates the use of greater force to produce the same degree of comminution of the food, and believe that the greater force required for mastication produces alveolar resorption and traumatic occlusion. However, many other observers, some on the basis of studies of native races, consider that such degrees of wear as will eliminate the cusps of the teeth are desirable and conducive to the health of the periodontal tissues. Among these are Gottlieb and Orban^{40, 33} (*loc. cit.*, p. 38) and Campbell (*loc. cit.*, p. 151).

At Pātep II, although the amount of attrition appeared to have considerably reduced lateral trauma caused by cusp-interference, in some of the older people there were examples of perfectly ground-in and normal occlusions associated with the second degree of bone-loss (figs. 43 and 44).

At Kavataria anterior overbite was minimal or absent and wear of the occlusal surfaces of the posterior teeth suggested that there could not have been

⁴⁷Rabkin, S.—Dental conditions among prehistoric Indians of Northern Alabama. *J.Dent.Res.*, 21, 211, 1942.

⁴⁸Miller, S. C.—Textbook of periodontia, London, p.420, 1938.

⁴⁹Box, H. K.—Treatment of the periodontal pocket, Toronto, p.30, 1928.

any great amount of trauma during lateral excursions of the mandible; yet in the adults advanced degrees of periodontitis were generally present.

At Korovagi the occlusal aspect of the posterior teeth was worn down within about fifteen years of their eruption to a nearly plane or even a concave surface. However, fully balanced occlusion was only rarely attained, because of the very common deep anterior overbite, and thus trauma of the periodontal tissues of the anterior teeth would have been severe. This may have caused the frequently observed loosening of lower anterior teeth*. There were, however, a few subjects, aged between 35 and 50 years, who had a balanced functional occlusion, yet even these exhibited amounts of bone-loss which were assessed as degrees 2 and 3. Those authorities who maintain that flattening of the cusps actually leads to periodontal breakdown may therefore be correct.

It is, then, difficult to say whether the views of Miller⁴⁸ and of Box⁴⁹ are true or not, but it is certainly true that occlusal attrition and periodontitis were coexistent in many subjects in New Guinea.

(b) Approximal attrition. Black⁵¹ (*loc. cit.*, p. 125) states that approximal attrition frequently leads to pathological changes in the periodontal tissues, because the contact becomes loosened and food is forced between the teeth and on to the interdental gingivae. On the other hand Stones⁵², from an examination of Egyptian skulls, considers that approximal attrition should protect the periodontal tissues because (i) it lessens the size of the triangular space between the two teeth into which food could be forced and (ii), as the attrition progresses, the forward migration of posterior teeth prevents any loosening of the contacts between them.

From observations in New Guinea it is impossible to decide whether approximal attrition and periodontitis are causally related: both conditions were almost invariably present in older people. There are, however, other possible causes for the periodontitis observed, and several models (e.g., fig. 17) show extensive approximal attrition without any (apparent) loosening of the contacts.

D. *Infections* (for example, by Vincent's organisms). No original data were collected.

E. *Chemical Irritation* (for example, that possibly arising from the chewing of betel nut). No original data were collected.

SUMMARY AND CONCLUSIONS.

1. In the three New Guinea villages from 52.50% to 76.37% of the adults exhibited loss of alveolar bone caused by periodontitis. In middle and old

*Kirkpatrick⁵⁰ believes that a similar condition among natives on the Island of Manus may be due to the attritional effect of chewing betel nut and lime; this chewing involves mainly the posterior teeth which apparently lose their cusps without a concurrent compensating reduction in the length of the anterior teeth. His view is supported by the fact that betel nut was comparatively scarce in both Kavataria and Patep II, as against Korovagi where it was used extensively by both men and women and sometimes even children.

⁴⁸Kirkpatrick, R. M.—Diet in relation to gingivitis: field observations in New Guinea, *J.Amer.Dent.Ass.Dent.Cosmos*, 24:197, 1937.

⁴⁹Black, G. V.—Operative dentistry, 7th ed., Chicago, vol. 4, 1936.

⁵²Stones, H. H.—The effects of diet upon the incidence of dental caries and parodontal diseases in man, *Brit.Dent.J.*, 83:1, 1947.

age many subjects showed stages of the disease which would in white populations probably be considered as detrimental to the health of the body as a whole.

2. The results of the Nutritionist's observations exclude lack of vitamin B₂ complex or of vitamin C as factors in the aetiology of the periodontal disease observed in New Guinea.

3. Although malocclusion and/or lack of occlusal wear are considered by some to predispose to periodontal disease, nevertheless periodontitis still existed in many subjects with a balanced functional occlusion and what should be a desirable amount of occlusal wear.

4. Precisely what degree of fibrosity and toughness of food would be necessary to keep the gingival tissues satisfactorily stimulated and the teeth free from calculus is unknown, but it is practically certain that the amount of calculus and debris seen around the teeth in New Guinea was sufficient to cause irritation. The clinical state of the teeth and supporting tissues made it obvious that the food habits and practices of these natives were not satisfactory in this respect.

(To be Continued.)

MEDICAL DISPLAY

Of topical interest is the Second Exposition of Medical Apparatus to be held by Commonwealth Industrial Gases Pty. Ltd., in the Ballroom, The Hotel Australia, March 15-22, 1950.

Modern apparatus of both local and overseas origin for the administration of gaseous anaesthetics for general surgery, obstetrics and dentistry will be featured.

Medical films comprising a wide and interesting scope of subjects will be screened continuously. The attention of readers is directed to the announcement by C.I.G. in this issue.

BASIC WAGE ADJUSTMENTS

As from the first pay period in February 1950, the wages for Dental Assistants and Secretaries and Dental Mechanics are announced as follows:—

	Port Kembla-Sydney, Newcastle Wollongong per week.			Elsewhere per week.		
	£	s.	d.	£	s.	d.
Dental Assistants and Secretaries:						
Under 18 years of age	3	1	1	2	19	7
At 18 years of age	3	6	6	3	5	1
At 19 years of age	3	11	7	3	10	2
At 20 years of age	3	17	0	3	15	4
At 21 years of age or over with less than one year's experience	4	9	6	4	8	0
At 21 years of age or over with one or more years' experience	5	4	6	5	3	0
Dental Mechanics:						
Adult Male (higher rate)	10	13	0	10	10	0
Adult Male (lower rate)	9	15	0	9	12	0
Adult Female (higher rate)	7	11	0	7	9	6
Adult Female (lower rate)	6	13	0	6	11	6

The **ADA** JOURNAL
NSW *of* AUSTRALIA
EDITORIAL DEPARTMENT

BROADENING THE FIELDS OF RESEARCH

It was indeed a fortunate circumstance that enabled representatives from the Institute of Dental Research to become members of a team of workers sent by the Government of Australia in 1947, to carry out a nutrition survey in some of the territory of Papua, and New Guinea.

In this issue of the Journal, we publish the first half of the report of the dental survey and the remainder will follow. It will be realised from the report that one of the most important results of the survey is that the territories of New Guinea and similar areas provide valuable sources of data which, investigated intelligently, could contribute to the welfare of the so-called civilised communities as well as other races.

Many problems confront the research worker in dental sciences, not the least of which is the opportunity to study people whose environment is free from those factors research has demonstrated as controlling the onset and incidence of dental caries.

The enterprise demonstrated by the Director of the Institute of Dental Research is to be praised, for, surveys of this nature, which take on all the characteristics of an expedition, require much planning and organisation. Many problems are encountered when work has to be carried out in remote areas away from the technical resources of the modern world and handicapped by climatic conditions.

One example of the resourcefulness of the party is borne out by the good quality of the dental radiography. By the same token there is demonstrated the speed with which western civilisation could penetrate these areas, and therefore it becomes of paramount importance that such studies should be pursued relentlessly and vigorously whilst there remain groups of such native races living in their own natural environment.

Such studies must be all-embracing and planned to include enquiry into every aspect of the individual and community organisation, the economic status and cultural background.

It is recalled on one occasion when the question of dental research (in relation to a National Dental Health Service) was under consideration, a suggestion was made, in all seriousness, that research should be given up in Australia and the monies thereby saved sent to assist some other country's activities in this direction. The work now reported refutes such an extra-

ordinary contention and simply demonstrates the broad vision of its planners who have gone further along the road towards the study of a problem produced by a disease, with a highly complex aetiology, suffered by well-nigh all the population of this country. This fact alone makes the study all the more difficult, since in fact it has, generally speaking, to be done on people who have the disease; there is no opportunity to study the totally healthy mouth on any wide scale. In general, the more pieces of the problem that can be studied and integrated, the clearer the nature of the whole problem becomes.

Surveys conducted on broad lines, such as this Nutrition Survey in New Guinea, are likely to be more fruitful and give a rational view of the problem, than the more popular and easily implemented surveys made in restricted fields.

The Director of the Institute has pointed out that it is not always possible to assemble the right team for the particular task, for after all, we are a people of small populations. That is not to say that we should give up research, however. For the pooling of resources between closely associated peoples may facilitate the attack on the problem; such was emphasised at the Seventh Pacific Science Congress held in 1949 in New Zealand.

The work already undertaken could well be extended by a combined Australian-New Zealand expedition to various Pacific territories, particularly to those as yet free from the influence of the western world. In this regard we recall the thoughts of a former Research Scholar who some years ago advocated an extension of study to field surveys. Whatever the survey and the personnel selected to carry out the study, the results depend upon the careful analysis of the data, and this in the end remains largely subject to the mental processes of the individual investigator. There are many important factors but none so important as time, for as the sands of time run out the advancing edge of civilisation crowds in upon the untouched zones.

CORRIGENDUM

Line 12, page 528 in the December issue of the Dental Journal should read:—

" Eastern Suburbs, Northern Suburbs and St. George."

News and Notes

TWELFTH AUSTRALIAN DENTAL CONGRESS

WILFRID HALL TERRELL.

The Executive Committee of Congress is happy to announce that under the auspices of the Dental Board of New South Wales and the Australian Dental Association, New South Wales Branch, Dr. Wilfrid H. Terrell will visit Australia during the period August-September, 1950.

Apart from delivering a series of lectures at the Congress, he will travel to various centres in New South Wales and lecture to members of the profession. Dr. Terrell is well known to the profession in this State, and many members will recall the series of lectures and demonstrations he gave here in 1933.

He has held office as President, American Denture Society, of the Pacific



W. H. TERRELL.

Coast Society of Prosthodontists and is a member of the Academy of Denture Prosthetics, a Fellow of both the American College of Dentists and International Academy of Dentistry. For twelve years he was Professor in the Prosthetic Department in the College of Dentistry of the University of Southern California.

In addition to the many activities relative to his profession, he is an enthusiastic aviator, flying his own plane to various centres during the past fifteen years. We all look forward to an instructive and enjoyable experience from his visit.

THE UNIVERSITY OF SYDNEY

NORTHWESTERN UNIVERSITY SCHOLARSHIP.

Applications are invited from graduates in the Faculty of Dentistry, University of Sydney, for the Northwestern University Scholarship for 1950. The Faculty of Dentistry will consider applications from graduates during the period 1939-1949. The closing date for acceptance of applications is 31st March, 1950. Applications are to be addressed to the Registrar, University, Sydney.

DENTAL JOURNAL OF AUSTRALIA

Owing to requests having been received for the January-February, 1947, issue, and the August, 1949, issue of "*The Dental Journal of Australia*," it would be greatly appreciated by the Editor if members not now in need of their copies could kindly forward them to the office of the Association, 135-137 Macquarie Street, Sydney, in order that recent orders may be fulfilled.

EVENTIDE HOMES APPEAL

Some two years ago a small Committee was appointed for the purpose of collecting money and providing homes for elderly people. Since then they have purchased a block of land at Padstow Park, had it cleared, surveyed, partially fenced in and have erected three cottages and planted a number of ornamental trees. The fourth cottage is now under construction.

The three cottages are already occupied by six very happy and contented people.

It is the intention of the committee during the next two years, to build another fourteen cottages and an administrative block in this area. In these cottages, elderly men and women will be able to spend the evening of their lives free of worry and financial difficulties.

Donations to this worthy fund are free of Income Tax, and may be sent to the Secretary, Eventide Homes Appeal Committee, Room 306a, 3rd Floor, M.L.C. Building, 44 Martin Place, Sydney.

Association Activities

AUSTRALIAN DENTAL ASSOCIATION

NEW SOUTH WALES

Extract from the Minutes of the Special Meeting of Executive Committee held in the Council Room, B.M.A. House, 135-137 Macquarie Street, Sydney, on Tuesday, 22nd November, 1949, at 9 p.m.

Present: Dr. J. V. Hall Best, Dr. R. M. Cloutier, Mr. N. E. Edney, Mr. H. McD. Finnie, Mr. W. A. Grainger, Dr. F. E. Helmore, Mr. R. Krauss, Dr. A. G. H. Lawes, Mr. R. G. Leeder, Dr. E. R. Magnus, Mr. R. Y. Norton, Mr. F. R. Reid, Mr. J. W. Skinner, Mr. R. H. Sullivan, Mr. Ralph Thompson.

In attendance: Mr. Robert Harris, Secretary.

Appointment of Chairman: The Secretary called for nominations for Chairman until the election of the President.

It was resolved:

That Dr. Hall Best take the chair.

Election of President: The Chairman called for nominations for the office of President.

It was moved by Mr. Edney and seconded by Dr. Helmore:

"That Dr. Magnus be elected President for the ensuing year."

Dr. Lawes then moved an amendment which was seconded by Mr. Leeder:

"That Mr. Edney be elected President for the ensuing year."

There being no other nominations it was resolved that the Secretary, Mr. Harris, be appointed scrutineer.

A ballot was then taken and the Chairman declared Dr. Magnus elected to the office of President for the ensuing year.

Mr. Edney congratulated Dr. Magnus on his election and assured him of his full support.

Dr. Magnus, on taking the Chair, thanked the members for electing him and intimated that he had the interests of the profession at heart.

Mr. Edney moved a vote of thanks to Dr. Hall Best for occupying the Chair.

Election of Vice-Presidents: The President, Dr. Magnus, called for nominations for the offices of Vice-President and members were reminded that it had been sug-

gested at a previous Executive Meeting that the new Executive should give consideration to the immediate past President being elected to an Honorary Officers' Committee.

It was moved by Mr. Edney and seconded by Mr. Thompson:
"That Dr. Lawes be elected a Vice-President for the ensuing year."

It was moved by Mr. Norton and seconded by Mr. Reid:

"That Dr. Helmore be elected a Vice-President for the ensuing year."

There being no further nominations the President declared that Dr. Lawes and Dr. Helmore elected Vice-Presidents for the ensuing year.

Election of Honorary Treasurer: On the President calling for nominations for the office of Honorary Treasurer it was moved by Mr. Reid and seconded by Mr. Edney:
"That Dr. Cloutier be elected Honorary Treasurer for the ensuing year."

There being no further nominations the President declared Dr. Cloutier elected Honorary Treasurer for the ensuing year.

The following Committees were appointed:—

Journal: Chairman, Mr. Ralph Tompson; Members, Mr. Ralph Tompson, Dr. A. G. H. Lawes, Mr. H. R. Sullivan and Dr. A. G. Rowell re-appointed; Mr. J. G. Fletcher, Mr. R. Y. Norton and Mr. A. G. Hunter appointed.

Research: Mr. Sullivan being the only member of the Research Committee who was also a member of the Executive Committee, the President declared him elected Chairman of that Committee. Members, Mr. H. R. Sullivan, Dr. J. S. Baird and Professor A. J. Arnott re-appointed; Dr. R. M. Kirkpatrick and Mr. R. L. Gabriel appointed.

Dental Health: Chairman, Mr. Ralph Tompson; Members, Dr. A. Thornton Taylor, Mr. G. Morse Withycombe, Mr. A. G. Hunter, Mr. N. D. Martin and Mr. J. W. Skinner re-appointed; Mr. Ralph Tompson, Dr. L. Pudney, Mr. R. Y. Norton, Dr. L. G. Crane and Dr. Clive Blackwell appointed.

Appointment of Divisional Representatives as additional members of the Executive: Letters and telegrams from Divisions nominating their representatives for appointment as additional members of the Executive were before the meeting.

It was resolved:

That the following Divisional Representatives be appointed additional members of the Executive Committee:

Mr. S. H. Neal, North-Eastern Division; Mr. L. Cooper, Southern Tablelands Division; Dr. J. D. Oddy, South Coast Division; Mr. L. Mackenzie, Blue Mountains Division; Dr. A. G. Rowell, Western Division; Dr. J. D. Benson, North and North-West Division; Mr. G. M. Cox, Southern Division.

Extract from minutes of Meeting of Executive Committee held in the Council Room, B.M.A. House, 135-137 Macquarie Street, Sydney, on Monday, 5th December, 1949, at 7.40 p.m.

Present: Dr. E. R. Magnus, President, in the Chair; Dr. A. G. H. Lawes, Vice-President; Dr. F. E. Helmore, Vice-President; Dr. R. M. Cloutier, Honorary Treasurer; Dr. J. V. Hall Best, Mr. N. E. Edney, Mr. H. M. Finnie, Mr. W. A. Grainger, Mr. R. Krauss, Mr. R. G. Leeder, Mr. R. Y. Norton, Mr. F. R. Reid, Mr. J. W. Skinner, Mr. H. E. Sullivan, Mr. Ralph Tompson, Dr. J. D. Oddy, South Coast Division; Dr. A. G. Rowell, Western Division.

Apologies: Mr. L. Mackenzie, Blue Mountains Division; Mr. S. H. Neal.

In attendance: Mr. Robert Harris, Secretary.

Welcome to Dr. Oddy: The President welcomed Dr. J. D. Oddy as an additional member of the Executive Committee representing the South Coast Division, to the meeting.

Appointment of Divisional Representatives as additional members of Executive: Letters dated 22nd and 29th November, 1949, from the Far North Division and the Newcastle and Hunter River District Division respectively were read nominating their representatives for appointment as additional members of the Executive Committee.

It was resolved that the following Divisional Representatives be appointed additional members of the Executive Committee: Mr. H. W. Warner Shand, Far North Division; Mr. C. D. Reynolds, Newcastle and Hunter River District Division.

Appointment of Committees: The following Committees were appointed:

Syllabus: Mr. J. W. H. Skinner, Chairman; Mr. W. A. Grainger and Mr. J. W. H. Skinner members.

Sports and Social: Mr. G. R. Reid, Chairman; Mr. W. E. Mitchell, Mr. T. Royse-Smith, Mr. K. O. Binns, Mr. R. G. Leeder, Mr. R. Y. Norton, Mr. R. W. Wilson, Mr. F. R. Reid, Members.

Post Graduate Course: Mr. W. A. Grainger, Chairman; Mr. R. Krauss, Mr. H. M. Finnie, Mr. W. A. Grainger, Dr. R. W. Halliday, Members.

Divisions: Mr. R. Krauss, Chairman; Mr. N. E. Edney, Mr. H. M. Finnie, Dr. A. G. Rowell and Mr. R. G. Leeder, Members.

Benevolent and Provident: Dr. R. M. Cloutier, Chairman; Mr. E. B. Green and

Dr. R. M. Cloutier, Members.

Library: Mr. Ralph Tompson, Chairman; Mr. A. G. Hunter, Mr. A. O. Watson, Mr. Ralph Tompson and Dr. R. W. Halliday, Members.

Committee of the Honorary Officers: It was resolved that there be constituted a Committee of the Honorary Officers of this Association plus a past President who is a member of the Executive Committee, and that such Committee will continue functioning in place of the Honorary Officers and have access to their records. It was also resolved that Mr. N. E. Edney be appointed to the Committee of Honorary Officers.

Frank Marshall Prize: Letter dated 14th November, 1949, from the Registrar of the University of Sydney was read intimating that the Faculty of Dentistry had considered the conditions for the award of the Frank Marshall Prize and had suggested some minor alterations to the conditions which they recommend should be as follows:—

1. The Prize shall be awarded to an Ex-Service student or child of an Ex-Service man or woman for general proficiency in the Third Year of the course of study in the Faculty of Dentistry within the University of Sydney.
2. The Prize shall be awarded each year by the Faculty of Dentistry when the results of the annual examinations are available.
3. The value of the Prize to be awarded in each year is £10.

It was resolved that these recommendations be adopted.

Dental Assistants' Conciliation Commission: The President stated that he had asked Mr. Edney to accept re-appointment as the Association's representative on the Dental Chairside Assistants' Conciliation Commission.

It was resolved that Mr. Edney be re-appointed as this Association's representative on the Dental Chairside Assistants' Conciliation Commission and that Mr. Harris be appointed alternative representative.

In this connection Mr. Edney asked for and was granted permission to request the adjournment of any meeting of the Commission so that he could ascertain the wishes of the Executive Committee.

Life Membership: It was resolved that the question of life membership be referred to the Honorary Officers for consideration and report to the next Executive Meeting.

FEDERAL OFFICE.

Report of Working Party: The President stated that even as long ago as 1945 this State Branch had been of the opinion that if a National Dental Health Scheme were introduced an ancillary service should be established for the treatment of children by fully trained dental hygienists; the only question raised was the age up to which children should be treated. The Victorian Branch had opposed the use of school dental nurses, as they are now termed. Mr. Hartley Gibson had written a report to show that the service could be staffed by graduates only. This was followed by a Government report confirming this view and then just prior to the Executive Meeting before the Annual Federal Meeting the Working Party's report had been received and the Executive had decided it was impossible adequately to discuss and study it. Following this the report was briefly discussed at the Annual Meeting and the conference with the Minister for Health was postponed but the State Branches were asked to consider it and submit their comments before the end of the year.

The President stated further that the Honorary Officers had considered the report and framed a recommendation. This recommendation was read and several alterations were agreed upon.

It was resolved that this Branch having discussed the Working Party's Report, are of the opinion that the findings are based on false premises in that we do not think there will, for many reasons, be an annual influx into the profession of 500 graduates—the figure on which the findings of the Working Party rely, and that there is grave danger of dilution of the profession if large numbers of graduates are in future brought by Government aid and inducement into its ranks, and furthermore it is important to realise that no satisfactory explanation has ever been brought forward as to how graduate personnel can be permanently retained exclusively in the treatment of children in order to maintain the essential continuity of service on which the success of the scheme depends. In 1943 this Branch was of the opinion that any National Dental Health Scheme for children must in the main be originally staffed by women trained on the lines of the New Zealand School Dental Service. This principle has never been departed from and we now stress our opinion that an ancillary service is necessary with adequate graduate supervision.

Committee of Nutrition: Letter dated 16th November, 1949, from the Federal Office was read requesting this State Branch to forward the names of dentists whom they consider should be suitable to represent the Association on the Committee of Nutrition of the National Health and Medical Research Council.

It was resolved that the names of Dr. R. M. Kirkpatrick and Mr. R. Tompson be submitted.

Standards Committee: Letter dated 30th November, 1949, from the Chairman of the Standards Committee enquiring the name of this Branch's Standards Liaison Officer for the ensuing year appointed in accordance with the Australian Dental Association Federal Delegates' decision that such officers should be appointed annually, was read.

It was resolved that Mr. R. Harris be appointed Standards Liaison Officer for this State Branch.

Federal Constitution: Letter dated 23rd November, 1949, from the Victorian Branch relative to the proposed changes to the Federal Constitution was read. This letter suggested that the New South Wales Branch should study the comments contained therein and advise the Victorian Branch of their approval or otherwise so that some finality could be reached before the next meeting of the Federal Council. Copies of the letter and proposed alterations were circulated to members present to aid them in considering this question.

It was resolved that after consultation with the Association's solicitor, Mr. Utz, the Committee of the Honorary Officers be empowered to act in connection with this matter. In this connection it was suggested that a committee be appointed to consider the recasting of both the Federal and State constitutions.

Congress Commission: The President of Congress, Dr. Hall Best, reported that a meeting of the Section Chairmen and Directors of Clinics had been held to consider the method of presentation of material at Congress and that a meeting of the Congress Executive will be held shortly.

Dental Health: The Chairman of the Dental Health Education Committee, Mr. Tompson, reported that arrangements had now been made for Miss Ida Crooke, professional typist, to conduct the Dental Essay Competitions and an application had been sent to the Director of Education for permission to hold the State Schools Dental Essay Competition on 31st March, 1950. The two new posters which the Department had ordered were tabled and Mr. Tompson reported that a letter would be sent out with each relative to their use in teaching.

Divisions: The Chairman of the Divisions Committee, Mr. Krauss, enquired if a date had been set down for the holding of the Delegates from Divisions meeting in 1950. It was agreed that this meeting would be held in accordance with the previous decision, in May or June, and that the Divisions would be reminded of this.

Survey of Fees: The Chairman of the Survey of Fees Committee, Mr. Skinner, reported that there had been 430 replies to the questionnaire sent to members and read a list giving details of the returns from the various classified districts. He stated that the Committee would meet soon to dissect the information given.

MEMBERSHIP.

Re-Admission: It was resolved that Mr. E. L. Wilkinson, whose application was in order and who had paid the requisite subscriptions, be re-admitted to membership of this State Branch as from 5th December, 1949.

Membership Committee: Attention was drawn to the fact that the election of the Membership Committee had not taken place earlier when other Committee members were being appointed.

It was resolved that Dr. Helmore, Mr. Finnie, Mr. Norton, and Mr. H. R. Sullivan be appointed to the Membership Committee and that Dr. Helmore be appointed Chairman. Also that this Committee be empowered to arrange an approach to students to apprise them of the benefits to be extended to them by the Association.

CORRESPONDENCE.

Dental Research Scholar: Letter dated 18th November, 1949, from the Dean of the Faculty of Dentistry forwarding a report by the Dental Research Scholar was read.

It was resolved that this letter and report be received and that the Secretary request further information from the Dean for submission to the Research Committee.

In this connection Mr. Sullivan reported that Mr. Lilienthal, the Dental Research Scholar, was now on his way to work at Balliol College, Oxford, under Professor Woods, which was a signal honour bestowed for the first time on an Australian.

It was resolved that a letter of congratulation be sent to Mr. Lilienthal at Oxford University to meet him on his arrival and wishing him success in his studies.

GENERAL BUSINESS.

New Graduates: The question of placing new graduates in suitable positions as assistants or in towns where their services are needed was raised with a view to the Association taking some steps to place the large number of students likely to graduate this year.

It was resolved that an immediate approach be made to Divisions and Dental Groups pointing out that there will be a large number of graduates joining the profession and requesting their assistance in advising of positions available.

**AUSTRALIAN DENTAL ASSOCIATION
(NEW SOUTH WALES BRANCH)**

NORTH EASTERN DIVISION

The first Annual General Meeting of the North Eastern Division of the New South Wales Branch of the Australian Dental Association was successfully held on the week-end, 5th and 6th November, at Wauchope.

Nineteen members of the Division were in attendance, representing all towns from Gloucester to Coff's Harbour, and Dr. E. R. Magnus and Mr. R. Y. Norton, the visiting clinicians, were also present.

Main business of the meeting was the election of office-bearers for 1949-1950.

Office-Bearers elected for 1949-50.

President: Mr. F. C. Haddan, Taree.

Vice-President: Mr. W. H. Edmonds, Kempsey.

Vice-President: Mr. J. A. Black, Macksville.

Secretary: Mr. J. W. Berry, Taree.

Treasurer: Mr. D. R. Paul, Wauchope.

Delegate: Mr. S. H. Neal, Taree.

Committee: Mr. C. B. Harrop, Gloucester; Mr. P. R. Stephens, Port Macquarie; Mr. R. L. Morris, Kempsey; Mr. D. C. Craig, Coff's Harbour.

Lectures were given by Dr. E. R. Magnus on "Radiography" and Mr. R. Y. Norton on "Orthodontia for the country practitioner." Both lecturers illustrated their talks with lantern slides, and a keen discussion followed.

By courtesy of the Amalgamated Dental Company and Mr. R. Huber, films were screened demonstrating the manufacture of acrylic teeth and colour selection for artificial teeth.

OFFICE-BEARERS, SOUTH COAST DIVISION, 1949-50

President: Mr. Ashton Marshall.

Vice-President: Dr. Harry Maldon.

Hon. Secretary: Mr. J. H. Palmer.

Hon. Asst. Secretary: Dr. J. D. Oddy.

Hon. Treasurer: Mr. R. G. Esdaile.

Delegate to Central Executive: Dr. J. D. Oddy.

WESTERN DIVISION

The Annual Meeting of the Western Division was held on Saturday, 3rd December, 1949, at the Hotel Canobolas, Orange, thirteen members of the Division being present at the meeting. The Central Executive was represented by Mr. N. E. Edney, who informed members of the latest developments of their Executive.

The election of Officers resulted as follows:—

President, Dr. G. R. Dent; Vice-President, Mr. L. B. Hume; Secretary, Dr. J. W. Meldrum; Treasurer, Mr. A. C. Dalziell; Committee, Mr. H. Burrows, Dr. H. P. Bradford, Mr. A. A. Horley, Mr. K. Campbell, Mr. R. Carter, Mr. D. K. Wall, Mr. G. H. Thomas, Mr. J. H. Boyd.

A discussion was held with a view to improving future meetings of the Division, and it was proposed that at least two meetings be held each year. Also that meetings in future consist of a full day devoted to Clinics followed by a dinner, with one day's sporting arrangements to be made for the following day.

A most informative table clinic was given by Mr. W. Kestel, together with a film of synthetic restorations.—J.M.

OFFICE-BEARERS FOR NORTH AND NORTH-WESTERN DIVISION FOR 1949-1950

Dr. J. D. Benson, Beardy Street, Armidale, President; Mr. O. Bennett, Brisbane Street, Tamworth, and Mr. H. G. Sinfield, Wentworth Street, Glen Innes, Vice-Presidents; Mr. R. L. Currie, Secretary; Mr. A. R. J. Wooller, Treasurer; Dr. J. D. Benson, Delegate to Executive.

OFFICE-BEARERS, FAR NORTH DIVISION, 1949-50

Mr. W. E. Smith, President; Dr. W. K. Hume, Vice-President; Mr. H. W. Warner Shand, Hon. Secretary; Mr. T. T. Pearson, Hon. Treasurer; Mr. H. W. Warner Shand, Executive representative.

OFFICE-BEARERS, NEWCASTLE AND HUNTER RIVER DISTRICT DIVISION, 1949-50

Mr. R. Krauss, President; Mr. R. Bruce, Vice-President; Mr. G. Solomon, Hon. Secretary; Mr. T. Emanuel, Hon. Treasurer; Mr. C. Reynolds, Executive representative.

OFFICE-BEARERS, NORTH-EASTERN DIVISION, 1949-50

Mr. F. A. Haddan, President; Mr. W. H. Edmonds, Vice-President; Mr. J. A. Black, Vice-President; Mr. J. W. Berry, Hon. Secretary; Mr. D. R. Paul, Hon. Treasurer; Mr. S. H. Neal, Executive representative.

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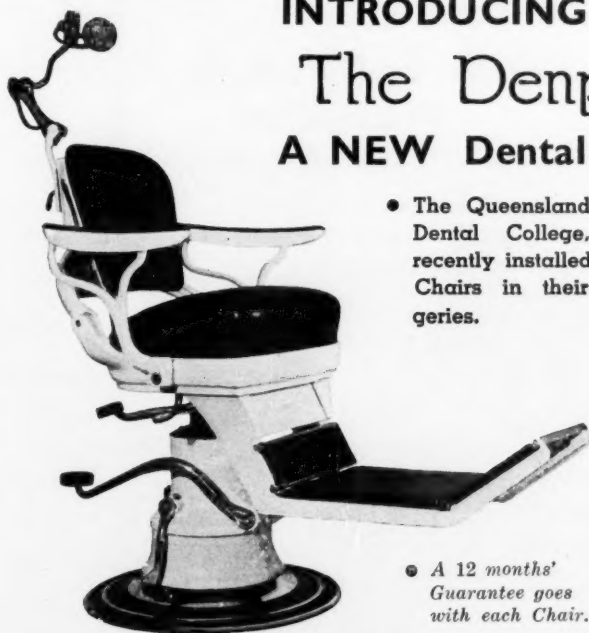
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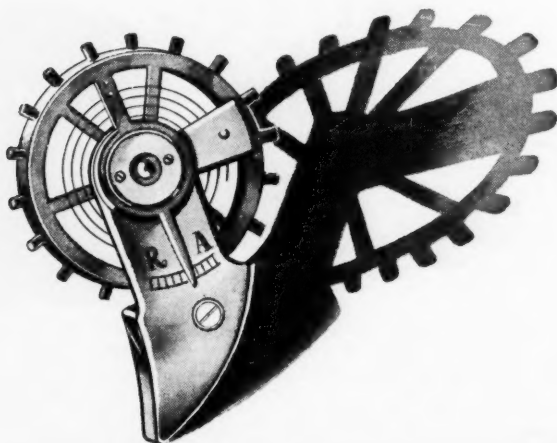


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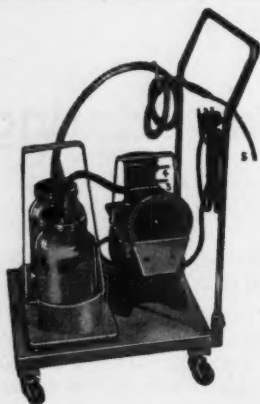
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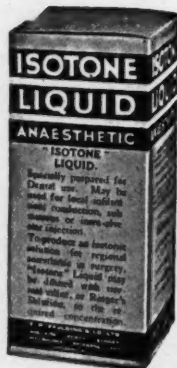
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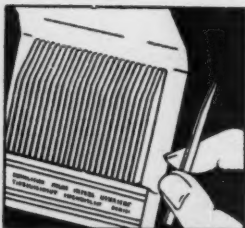
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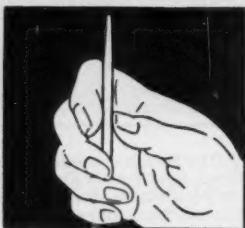
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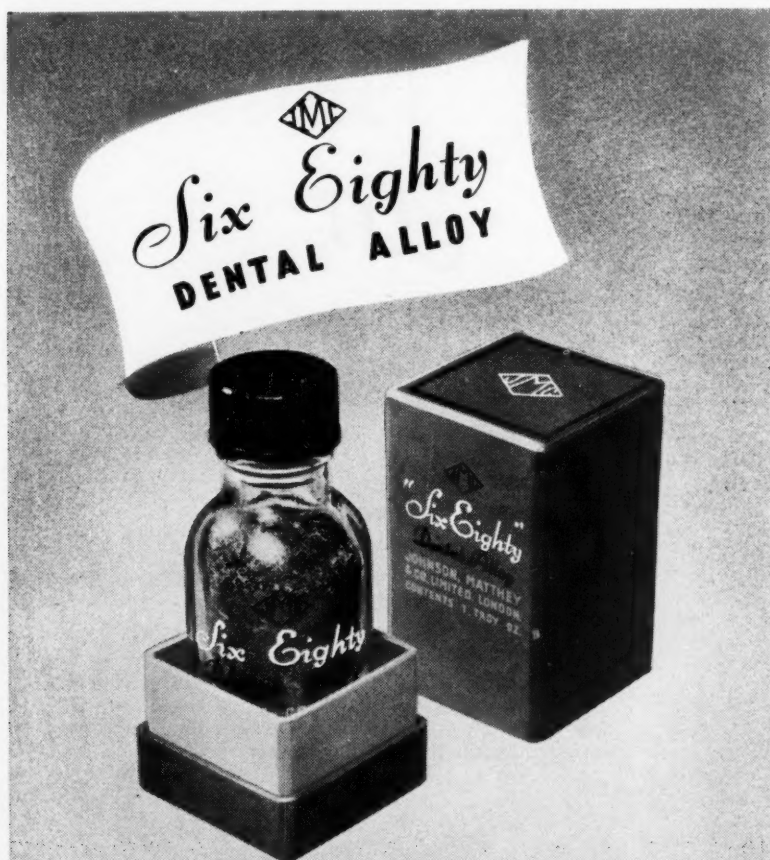
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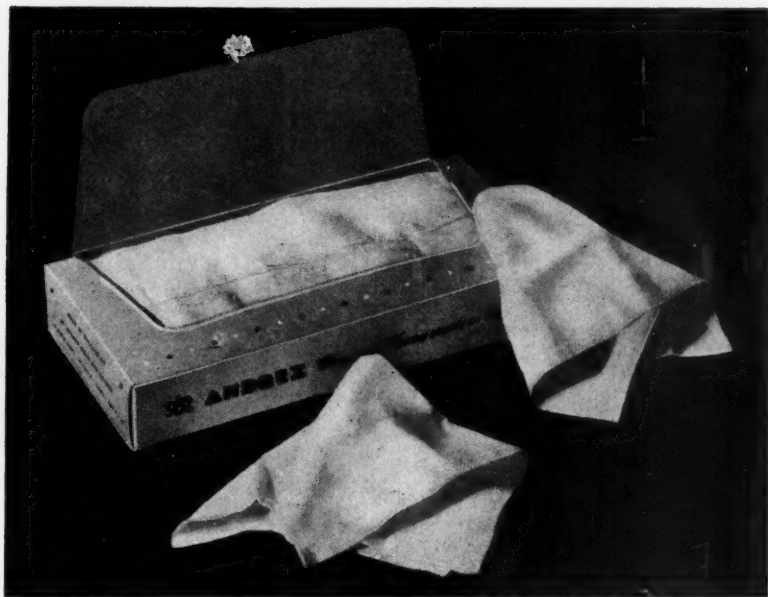
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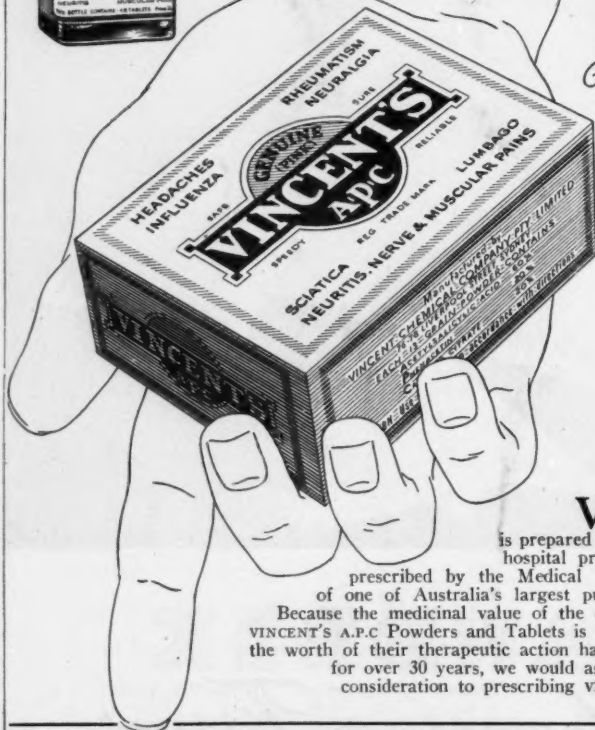
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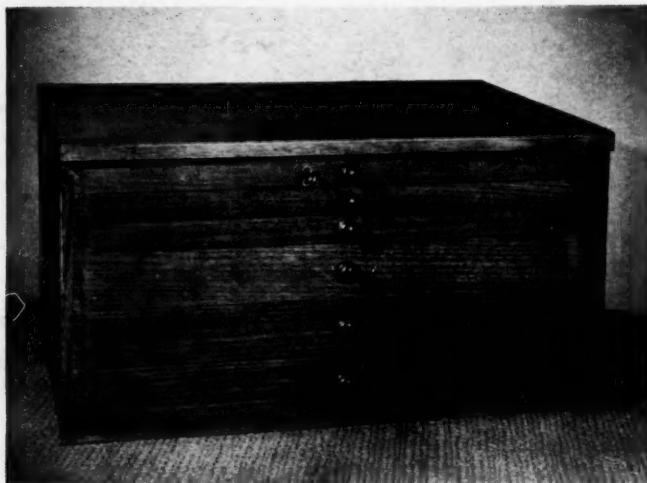
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